DESERT STORM & THE NEW AMERICAN WAY OF WAR: IMPLICATIONS FOR AIR FORCE 2030

BY

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ABSTRACT

Since Operation Desert Storm, the Air Force has experienced a reduction in the number of its aircraft, aircrew, and overall end strength. Intra-service choices and external influences have reduced production of replacement airframes, and will likely continue to reduce the number of future aircraft procured (F-22A, F-35A, KC-46A, and LRS-B). Though operating across the domains of air, space, and cyberspace, the US Air Force primarily employs airpower in the pursuit of national objectives. While reductions in size are not necessarily negative, the further reduction of aircraft and aircrews will likely have some effect on the culture and capability of the force. Anticipating and understanding these effects is crucial to future force planning to avoid not only a hollow force, but also a force that is confused as to its role in the defense of the nation.

While future force projection is fraught with uncertainty, this thesis attempts to provide a wave-top look at Air Force 2030, informed by expected changes within the rated force structure. The hypothesis is relatively simple: the force structure of 2010 was smaller than 1990; the force structure in 2030 will be smaller still. The question, to large degree, is what does that mean? While future reductions in the size of the rated force are likely, leadership may ameliorate adverse effects to culture through early awareness and pro-active engagement. To that end, this thesis will identify potential issues that may be associated with the expected reduction in aircraft and aircrews to generate discussion that will lead to early awareness and, hopefully, consideration of the topic.

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Introduction

We better be prepared to dominate the skies above the surface of the earth or be prepared to be buried beneath it.

General Carl A. "Tooey" Spaatz
1st Chief of Staff of the U.S. Air Force

The United States Air Force is arguably the most technologically advanced fighting force the world has ever seen. The increase in conventional combat capability seen over the past sixty-five years has illustrated the benefits of technological innovation for the American military. All services have become smaller, faster, and more capable. The successful employment of American airpower in Operation Desert Storm marks the start of this epoch, which has been called a *revolution in military affairs*. The benefits of stealth, precision weapons, and network-based information technologies have enabled a "new American way of war" which seeks a "quick victory with minimal casualties on both sides."[1]

The United States' strategy employed in Desert Storm was the beginning of the departure away from traditional conceptualizations of major combat, in which attrition warfare had been the trend.[2] Coupled with the demise of the Soviet threat only two years prior, the lessons of the first Gulf War helped shape U.S. Air Force (USAF) decisions as to

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Epigraph – Inscribed on the Air Force Memorial located in Arlington, VA. http://thedistrict.com/sightseeing/monuments-memorials-in-washington-dc/air-force-memorial/ (Accessed 17 May 2012).

[1] Max Boot, "The New American Way of War," *Foreign Affairs* 82, no. 4 (July/August 2003): 41-58.

[2] Boot, "New American," 41; Russel Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (Bloomington, IN: Indiana University Press, 1977). Boot references Weigley's *The American Way of War* which popularized the notion that previous U.S. major conflicts (U.S. Civil War, both World Wars, and, by and large, Korean War and Vietnam Conflict) were wars of production, and won "not by tactical or strategic brilliance but by the sheer weight of numbers."

what aircraft were necessary for an effective fighting force, exerting great influence on today's rated force structure.[3]

It seems almost naïve to suggest that further adoption of advanced technologies could provide anything but additional enhancement to the effectiveness of American airpower. Yet, there is give-and-take with the pursuit of any technology. Rarely in life are allocation-of-resource decisions made outside a zero-sum scenario. Adoption of new technology has allowed the Air Force to vastly increase the "speed, maneuver, flexibility, and surprise" of its operations, whether in a supportive or principal role.[4] In some ways, one might argue the USAF embraced technological innovation as doctrine. Alternatively, perhaps the Air Force pursued technology as strategy itself, hoping against hope that the next leap would fulfill the earliest dreams of airpower advocates. Myopically pursued, or as an institutional imperative, technology has allowed the Air Force to do more with less, facilitating a significant reduction in the number of aircraft required to *fly, fight, and win* the nation's wars. Yet, the reduction in aircraft is not solely the result of technological displacement.[5]

Internal Air Force choices, combined with external fiscal and social constraints, suggest a continuance of the current trend. The question is whether these choices have created a more or less capable force. Given the significant reduction in aircraft inventory in the twenty years since Desert Storm, would the Air Force have been capable of executing the air campaign of Desert Storm had it occurred in 2010? What insights do the past twenty years provide that may help form a basis for estimation as to

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[3] Rated force structure refers to aircraft and aircrew necessary to operate those aircraft.

[4] Boot, "New American," 42.

[5] Randall Collins, "Technological Displacement and Capitalist Crises: Escapes and Dead Ends." (Plenary address to the Hundredth Anniversary Sociological Review Conference, Billesley Manor, UK, June 2009) *Political Conceptology: Journal of Metadisciplinary Research*, no. 1 (2010): 23-34. Collins describes technological displacement as "the mechanism by which innovations in equipment and organization save labour, thereby enabling fewer employed persons to produce more at lower cost."

what the force of 2030 may look like? Finally, if it is possible to estimate the force structure of 2030, what implications does this potential force structure have for the Air Force strategically and culturally?

Methodology

This thesis will begin by examining the Air Force aircraft force structure present at the outset of the first Gulf War. It will compare the force structure of 1990 to that of 2010 in an attempt to discern what factors influenced most heavily any changes that have occurred. It is expected that technological displacement will account for much of the change, though consideration of the international threat environment and socio-political factors are also important. These factors, in concert with policy and strategy guidance, should be able to provide a baseline for estimation of what the rated force will look like in 2030 in mobility, fighter/attack, bomber, and air-breathing (non-space) intelligence, surveillance, and reconnaissance (ISR) platforms. It is expected that this force will be markedly different from the force of today. This paper's *raison d'être* is an examination of the issues associated with the potential force structure of 2030.

Aircraft Inventory Figures

Consultation of a number of sources was required to provide the raw data for USAF Total Active Inventory (TAI). The primary database consulted was a Mitchell Institute Study, *Arsenal of Airpower: USAF Aircraft Inventory 1950-2009.*[6] Supplemented by annual *US Air Force Statistical Digests* and the Air Force Association's *USAF Almanac*, this raw data provides the basis for TAI numbers presented in this thesis, provided in Appendix C. However, an important delineation as to the disposition of aircraft within USAF TAI is not obvious within this data.

Total Active Inventory is composed of aircraft assigned to Primary Aircraft Inventory (PAI), Backup Aircraft Inventory (BAI), and Attrition

[6] James C. Ruehrmund, Jr. and Christopher J. Bowie, *Arsenal of Airpower: USAF Aircraft Inventory 1950-2009* (Washington, DC: Mitchell Institute Press, 2010).

Reserve (AR).[7] Further, PAI is composed of aircraft assigned for four mission types: Operational (PMAI), Training (PTAI), Development and Test (PDAI), and Other (POAI), which includes Operational Support.[8] Appendix A provides a flow diagram of the relationship between aircraft management codes. In short, not all U.S. Air Force aircraft are available for combat-related operational missions. The Department of Defense's *Annual Defense Report to Congress* provided combat-coded aircraft data for years 1991-2003. Testimony before Congress and *Air Force Pamphlet 10-1403* provided data for those aircraft combat-coded in 2010. Averaged historical data provides the basis for combat-coded estimates for those aircraft not specifically listed for a given year in question: 70% for A-10s, 60% for F-15s and F-16s, 75% for xC-130 variants, and 75% for ISR aircraft. This data provides a baseline for analysis, recognizing that operational planning might require employment of more aircraft than notionally combat-coded (PMAI or POAI). Deployment of these aircraft (BAI, AR, PTAI, or PDAI) could result in degradation of routine maintenance and training, with long-term ramifications in airframe viability or aircrew qualification.

Desert Storm

Given its prominence as the foundational airpower strategy in this *new American way of war*, the first Gulf War is an appropriate starting point for the examination of future American airpower. This is in no way an endorsement of the belief that airpower has realized the potential

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[7] United States, General Accounting Office, Accounting and Information Management Division, "Air Force Aircraft Quantities," Letter to Department of Defense (GAO/AIMD-97-137R, 21 August 1997). http://gao.justia.com/department-of-defense/1997/8/financial-management-aimd-97-137r/AIMD-97-137R-full-report.pdf (accessed 14 March 2012). The GAO defines attrition reserve as "aircraft above the primary and backup aircraft that were procured to ensure that the authorized inventory of aircraft can be met upon damage or loss of an aircraft."

[8] Chairman of the Joint Chiefs of Staff Instruction 4410.01F, *Standardized Terminology for Aircraft Management*, 10 May 2011. http://www.dtic.mil/cjcs_directives/cdata/unlimit/4410_01.pdf (accessed 20 March 2012); Air Force Instruction 16-402, *Aerospace Vehicle Programming, Assignment, Distribution, Accounting, and Termination*, 1 December 2009.

polemically espoused by Douhet, but rather that the effectiveness of American airpower underwent a fundamental shift in the aftermath of the first Gulf War because of a revolution in military affairs. The rapid buildup of conventional forces in response to the Iraqi invasion of Kuwait and subsequent rout of dug-in Iraqi forces by a, at best, numerically equivalent Coalition combined-arms force could not have been successful absent the asymmetric advantage provided by American airpower.

While Chapter 1 provides more force-structure detail, a brief historical timeline demonstrates the unprecedented speed that characterized the Coalition buildup in the Gulf region. Following the cessation of open fighting in the Iran-Iraq War in 1988, U.S. Central Command (CENTCOM) completed a revision to its Operations Plan 1002 to "deal with an Iraqi invasion of Saudi Arabia through Kuwait." CENTCOM was conducting its first exercise of Draft plan 1002-90, completed only a few months prior, when Saddam Hussein publically threatened Kuwait and the United Arab Emirates on 17 July 1900.[9] The international community thought he was bluffing.

When Hussein invaded on 2 August 1990, he caught Kuwait and the world by surprise. While the Kuwaitis managed to launch six Mirage aircraft in response, they had failed to place their troops on alert, and Kuwait City fell only six hours after the invasion began. Rapidly moving eleven divisions numbering nearly 200,000 men into Kuwait, Iraq left 500,000 "Iraqi regulars and reservists" at home, apparently believing the U.S. and the world would not respond.[10] Faced with this open aggression, the buildup by American and Coalition forces began.

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[9] Williamson Murray, *Air War in the Persian Gulf* (Baltimore: The Nautical & Aviation Publishing Company, 1995), 7.

[10] CONFRONTATION IN THE GULF; Excerpts from Iraqi Document on Meeting With U.S. Envoy, New York Times, 23 September 1990. http://www.nytimes.com/1990/09/23/world/confrontation-in-the-gulf-excerpts-from-iraqi-document-on-meeting-with-us-envoy.html?src=pm (accessed 20 February 2012). Statements made by US Ambassador to Baghdad April Glaspie to Saddam Hussein during a 25 July 1990 meeting suggested the US would not act to intervene, "I know you need funds. We understand that and our

While CENTCOM had forward prepositioned supplies on critical bases in Saudi Arabia and other Gulf States, required number of troops, vehicles, aircraft, and munitions based on a continuously updated plan soon outstripped supply. The first USAF combat aircraft, fully armed F-15C air-superiority fighters, arrived in Saudi Arabia on 8 August 1990 after a direct flight from Langley AFB, Virginia that included seven aerial refuelings by KC-10 tankers.[11] These First Tactical Fighter Wing aircraft began flying border patrols along the Iraq-Saudi Arabia border the next morning, accompanied by an RC-135 Rivet Joint and E-3 Airborne Warning and Control Aircraft (AWACS), while the 82nd Airborne Ready Brigade began to establish airfield security in Dhahran.[12]

On 17 August, President George H. W. Bush activated the Civil Reserve Air Fleet (CRAF) for the first time in history, supplementing the surge employment of "90 percent of U.S. military long range airlift" with thirty-seven civilian airliners.[13] Airlift moved the majority of personnel to the area of operations (AOR), while sealift carried much of the materials and munitions to sustain the initial buildup.[14] Operation Desert Shield, the plan to defend Saudi Arabia, resulted in the rapid buildup to nearly 240,000 troops by late September. By this time, updated intelligence estimates placed the Iraqi strength in the Kuwaiti Theater of Operations (KTO) at 14 divisions and growing.

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opinion is that you should have the opportunity to rebuild your country. But we have no opinion on the Arab-Arab conflicts, like your border disagreement with Kuwait."

[11] Murray, *Air* War, 11.

[12] Andrew Leyden, *Gulf War Debriefing Book: An After Action Report* (Grants Pass, OR: Hellgate Press, 1997), 118.

[13] Leyden, *Gulf War*, 112; Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey: Summary Report* (Washington, DC: U.S. Government Printing Office, 1993), 4.

[14] Keaney and Cohen, *GWAPS: Summary*, 4. The GWAPS indicates that during the buildup to Desert Storm, "sealift brought about 95% of the equipment and supplies to the region, and strategic airlift (C-5, C-141, KC-10, and Civil Reserve Air Fleet) brought 99 percent of the personnel."

As October dragged into November, it became more obvious that Iraq was not going to advance into Saudi Arabia.[15] As "[Kuwaiti] tales of horror and tragedy were slowly coming to public light," the Iraqi force in Kuwait continued to grow in size. President Bush opted to change the nature of the buildup to provide an offensive option to remove Iraq from Kuwait, Operation Desert Storm.[16] Executive Order 12734, signed on 14 November, provided presidential authority to divert funds allocated for other military construction projects to "deal with the threat to national security and foreign policy of the United States caused by the invasion of Kuwait by Iraq," and invoked "emergency construction authority" for the Department of Defense.

In mid-November, Iraq announced the deployment of another 250,000 troops to the theater, which would have raised Iraqi troop levels in the KTO to 680,000 personnel,[17] though a mid-January Defense Intelligence Agency estimate placed final Iraqi troop levels at 42 to 43 divisions numbering 540,000 troops.[18] By the eve of the air offensive, 16 January 1991, U.S. and Coalition forces had executed a buildup of unheralded proportions. The final order of battle included over 2,000 aircraft, including those from six U.S. Navy carriers. While nearly fifty percent of the aircraft in theater were U.S. Air Force, all Coalition partners had had the opportunity to train together in progressively more complicated exercises over the five-month buildup.

In addition to the rapidity with which the Coalition deployed its response, it is important to note a significant technological and motivational gap between the Coalition and Iraqi forces. The numbers

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[15] Keaney and Cohen, *GWAPS: Summary*, 4.

[16] Leyden, *Gulf War,* 121.

[17] Philip Shenon, "MIDEAST TENSIONS: BUSH FAILS TO GAIN SOVIET AGREEMENT ON GULF FORCE USE; Iraq Announces It Plans to Add 250,000 Troops," *New York Times*, November 20, 1990. http://www.nytimes.com/1990/11/20/world/mideast-tensions-bush-fails-gain-soviet-agreement-gulf-force-use-iraq-announces.html (accessed 22 February 2012).

[18] Keaney and Cohen, *GWAPS: Summary*, 7-8.

alone fail to paint the full picture. Though the Iraqis held an advantage in the number of tanks, personnel carriers and artillery pieces were nearly even. However, the Coalition forces enjoyed an airpower advantage of nearly 4,000 aircraft (including helicopters) to Iraq's 700. Further, while the American military was entering its first true combat test as a post-Vietnam all-volunteer force, the Iraqi Army was largely conscripted, though many in the Republic Guard were veterans of the Iran-Iraq war. Leyden writes that, "a large number of the soldiers that served in the Iraqi Army were draftees. In fact, some of them were reportedly 'press-ganged' into service – they were given a rifle and taken to the front against their will."[19]

Incorporating elements of OPLAN 1002-90 and Colonel John Warden's INSTANT THUNDER, the military campaign that ultimately became Operation Desert Storm was conceptualized in four phases. Analyst Edward Mann describes these as: Phase I – "Strategic Air Campaign against Iraq [Instant Thunder]," Phase II – "Kuwait Air Campaign against Iraqi air forces in Kuwait," Phase III – "Ground Attack Combat Power Attrition to neutralize the Republican Guard and isolate the Kuwait battlefield," and Phase IV – "Ground Attack to eject Iraqi forces from Kuwait."[20] In reality, Phase I and II targets were attacked nearly simultaneously starting on 17 January 1991. As the campaign progressed, a shift to Phase III occurred in early February with Iraqi armor becoming the primary target.[21] Finally, Phase IV lasted only 100 hours, starting on 24 February. Desert Storm was, by nearly all accounts, a lightening war that surprised nearly everyone with its speed and effect.[22] It demonstrated the effectiveness of the new American way

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[19] Leyden, *Gulf War*, 42.

[20] Edward C. Mann III, *Thunder and Lightning: Desert Storm and the Airpower Debates*, (Maxwell, AL: Air University Press, 1995), 61-62.

[21] Department of Defense, *Conduct of the Persian Gulf War: Final Report to Congress* (Washington, DC: GPO, 1992), 140-142.

[22] DoD, *CPGW*, 275-276.

of war as captured by President Bush, "Gulf lesson one is the value of airpower…. [It] was right on target from day one. The Gulf war taught us that we must retain combat superiority in the skies . . . . Our air strikes were the most effective, yet humane, in the history of warfare."[23]

New American Way of War

The *new American way of war* is an ideal that the Air Force has embraced in the twenty years since Desert Storm. Popularized by Max Boot in his 2003 *Foreign Affairs* article by the same name, it suggests that the American military has revolutionized conventional force-on-force warfare through the integration of "precision firepower, special forces, and psychological operations" that are enabled by "dramatic advances in information technologies."[24] The counterinsurgencies in Iraq and Afghanistan notwithstanding, the adoption of new technologies has allowed American military operations to change the manner in which it engages in combat.

Rather than engage in battles of mass attrition designed to wear down the opposing side, the new American way of war seeks to rapidly overwhelm the enemy's ability to react, leading to Fuller's notion of "strategic paralysis."[25] Yet, the new American way of war is not just being able to kill the enemy before he can react; it is also about reducing collateral damage to civilians. American airpower is uniquely suited to this goal. Not constrained to operate linearly, it is capable of striking targets across the whole of the battle space. Precision munitions and networked systems have enabled single aircraft to engage more targets with greater lethality and accuracy, reducing the likelihood of collateral damage.

This new American way of war has changed the cost equation of air-to-armor engagement. A single aircraft is now capable of destroying

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[23] DoD, *CPGW*, 140.

[24] Boot, "New American," 42.

[25] JFC Fuller, *On Future Warfare* (London: Sifton Praed and Co., Ltd., 1928), 83.

multiple armored vehicles with the employment of precision weapons that cost a fraction of the armor they target. In Desert Storm, Air Force F-15E aircraft demonstrated the ability to destroy $1.5 million Iraqi T-72 main battle tanks with a single $10,000 GBU-12 precision bomb. With an F-15E capable of carrying eight such weapons, its $80,000 in munitions could eliminate a $12 million investment in armor. There are examples in Desert Storm in which it did.[26]

Desert Storm then serves as the starting point for an examination of the United States Air Force rated force structure, its inventory of aircraft and officer aircrew members. It also provides a benchmark for the force required in a conventional, force-on-force major contingency operation against which the force structure of 2010 and 2030 estimates will be compared.

[26] DoD, *CPGW*, 191.

Chapter 1

Air Force – Desert Storm

It is almost certain that we will be a smaller Air Force in the years ahead. But, our purpose, our goal, our mission, will not change. The only reason any of us are in this blue suit is to produce combat capability to defend the nation.

General Merrill A. McPeak
14TH Chief of Staff of the U.S. Air Force

As mentioned in the Introduction, the Air Force of Desert Storm provides the starting point for examining how and why the Air Force of today exists as it currently does. While Desert Storm did not truly follow the pattern of the new American way of war described by Boot, it does provide a first glimpse of how the USAF would apply stealth, precision, and network-based information technologies at the operational and tactical level. Further, the employment of American airpower in Desert Storm has much to say about current aircraft force structure.

This chapter will serve two purposes. The first is to provide a snapshot of what the operational force, especially its aircraft, looked like in 1990, examining what portion of the total force was committed to the execution of Desert Storm. This will provide insight into what force level might be required for a similar future mission, attempting to take into account those technological advances that have occurred since 1990. Secondly, it will look at the force required in light of United States National Security Strategy requirements.

National Security Strategy 1990

No discussion of force structure should be divorced from the national policy that governs why it exists in the first place. In the United

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Epigraph – Merrill McPeak, *Selected Works 1990-1994: Merrill McPeak* (Maxwell AFB, AL: Air University Press, 1995), 6.

States, the President articulates that policy through the National Security Strategy of the United States (NSS). March 1990 witnessed the first post-Cold War NSS, which was also the first of George H. W. Bush's presidency. It codified the belief that the likelihood of major war had diminished with the collapse of the Soviet Union, but appeared somewhat "schizophrenic" by asserting that "defense investment faces a dual challenge: to maintain sufficient forces to deter general war while also giving us forces that are well suited for the more likely contingencies of the Third World."[2] While NSS 1990 attempted to "embrace fully the reality of change in the Soviet Union… , response to that change as discussed in the report…was admittedly cautious" as a result of the long shadow of the Cold War.[3] The highest levels of government were still processing what the rapid disintegration of the Soviet Union, and the loss of Soviet influence over disparate actors, meant to national security.

Catalyzed during the oil crises of the previous two decades, the 1990 NSS recognized that "the free world's reliance on energy supplies from [the Middle East] and our strong ties with many of the region's countries continue to constitute important interests of the United States."[4] Further, in deference to contingency operations, Bush's National Security Strategy stated, "New conditions require continuing innovation as we move to incorporate stealth technology, extremely accurate weapons, improved means of locating targets, and new operational concepts into our combat forces."[5] The President had laid the foundation for a fundamental shift in strategy. Rather than a mass

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[2] The White House, *The National Security Strategy of the United States,* March 1990, 24. http://bushlibrary.tamu.edu/research/pdfs/national_security_strategy_90.pdf (accessed 22 February 2012); Don M. Snider, "The National Security Strategy: Documenting Strategic Vision," 2nd Ed., U.S. Army War College Strategic Studies Institute, 8. http://www.strategicstudiesinstitute.army.mil/pdffiles/pub332.pdf (accessed 22 February 2012). Snider suggests a "schizophrenic" duality of purpose.

[3] Snider, "Documenting Strategic Vision," 8.

[4] White House, *NSS 1990*, 13.

[5] White House, *NSS 1990*, 7.

attrition campaign required to defend Europe from numerically superior Soviet forces, NSS 1990 foreshadowed a new American way of war.

USAF Budget and Manpower

Insofar as the Air Force's budget and manpower were concerned in 1990, things had remained relatively consistent for the better part of the preceding fifteen years. Significant changes had occurred within the fighter and bomber communities on the heels of the Vietnam conflict, but the overall Air Force budget and manpower levels had remained relatively constant as a percentage of federal defense spending and manning. In 1990, the Air Force had 535,223 active-duty Airmen out of the 2.14 million U.S. military service members. There were 249,000 authorized full-time Air Force civilians, consistent with historical average percentages based on the number of active-duty uniformed personnel.

Likewise, the Air Force outlays for 1990 were $93.6 billion of $289.8 billion in defense outlays (31.3% of total defense spending). While defense spending had spiked at 28.7% of federal outlays during the Reagan buildup of the early 1980s, by 1990 it had returned to the post-Vietnam, late-1970s levels at 23.6% of federal spending.

Operational Aircraft Inventory

By 1990, USAF TAI was already beginning to show signs of the greater changes to come. Replacements for Korea and Vietnam-era aircraft, reaching the end of their service life, came in significantly fewer quantities. Since the Vietnam War, the Air Force had added 96 B-1B aircraft while retiring 196 B-52s.[6]

This example of technological displacement was becoming more widely evident as newer, more capable aircraft were required in fewer numbers. Likewise, the tanker fleet experienced similar reductions in size owing to the reduced need for nuclear alert tankers with the reduced

[6] The B-1B was not conventional-weapons-capable until the mid-1990s. In 1975, the USAF maintained 426 B-52s. By 1990, when the B-1B fleet has reached its full operational complement with 96 aircraft, the B-52 fleet had been reduced to 230 aircraft.

size of the bomber force, and the introduction of the KC-10A Extender. The 59 KC-10s added between 1980 and 1990 resulted in the retirement of 99 KC-135s. By 1990, the USAF TAI was 8,907 aircraft; of these, 6,604 were active duty, 593 Reserve and 1,710 Air National Guard (ANG).

Tactical Air Forces

At the start of Desert Storm, the Air Force had a TAI of 3,226 fighter and attack aircraft, including Active, Reserve, and Air National Guard. Interestingly, 1990 marked the maturation of the F-15C and F-16 programs, while also being the start of the rapid retirement of the F-4s and F-111s. Desert Storm saw the deployment of 805 of these aircraft.[7] After factoring in aircraft retirements already in progress, this demand occupied approximately 30% of the combat-coded fighter and attack aircraft. Furthermore, aircraft configured for laser-guided precision munitions (LGB) were in much higher demand. In 1990, the only Air Force fighter or attack aircraft capable of dropping LGBs were F-15E, F-111, and F-117s, nearly 73% of which were deployed, well in excess of the overall fighter/attack average.

Since the late 1970s, the Air Force had been slowly transitioning to the F-16, a multi-role fighter. By the beginning of Desert Storm, with the demise of the Soviet threat, the Air Force was rapidly retiring excess aircraft. Despite an inventory of 335 A-7 Corsair aircraft in 1990, nearly all in the Air National Guard, none deployed for Desert Storm. Three years later, the Air Force had sent all 335 to the Aerospace Maintenance and Regeneration Center (AMARC), affectionately known as the Air Force's "Boneyard." The Air Force relied on the A-10, AC-130, and F-16

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[7] Eliot A. Cohen, *Gulf War Air Power Survey: Volume V: A Statistical Compendium and Chronology,* (Washington, DC: Government Printing Office, 1993); Department of Defense, *Conduct of the Persian Gulf War: Final Report to Congress* (Washington, DC, 1992); Williamson Murray, *Air War in the Persian Gulf* (Baltimore: The Nautical & Aviation Publishing Company, 1995). Based on compilation of deployed aircraft from GWAPS, CPGW, and Murray. Reference Appendix C listing USAF TAI and ODS deployed aircraft.

aircraft for close-air support and battlefield-attack roles, though these aircraft relied upon the air superiority provided by the F-15 Eagle.

Air Superiority

Only 125 F-15s deployed of 770 TAI, a much lower percentage of the combat-ready inventory than was true for other aircraft. The F-15 had gone through a significant engine and avionics upgrade with the development of the F-15C model, providing greater range and capable of employing more advanced air-to-air weaponry. Of the 770 F-15 TAI, approximately 353 aircraft were F-15A models, of which 125 were in the ANG. Because of its inclusion in the plan as the primary offensive (OCA) and defensive counter air (DCA) aircraft, only F-15C models were included. With a TAI of 417 F-15Cs, the deployment of 125 of 250 combat-coded aircraft reflects a deployment rate of 50%.

F-15Cs were incomparable in combat against the Iraqi air threat. Coalition intelligence estimates varied, but they suggest Iraq possessed at least 275 air-superiority fighters, with an additional 360 multi-role attack fighters.[8] Additionally, 400 trainers were capable of limited combat roles.[9] What the numbers fail to reveal is the significant technology disparity between the F-15Cs and the Iraqi fighter aircraft. Of the estimated 275 Iraqi air-superiority fighters, only 30 MiG-29 fighters purchased from the Soviets were anywhere close to the F-15Cs in capability. The remaining aircraft were older Russian, Chinese, or French third-generation fighters, whose pilots bore the brunt of the Iraqi air-to-air combat losses. Further, doctrine, training, and experience played a significant role. Coalition pilots reported Iraqis "attempted very little maneuvering, either offensive or defensive, between the time when the air intercept radar locked on to them and the time when they were

[8] James P. Coyne, *Airpower in the Gulf* (Arlington, VA: Air Force Association, 1992), 19.
[9] Cohen, *GWAPS: Vol. V*, 18.

hit by air-to-air missiles."[10] Throughout the conflict, USAF pilots demonstrated the exceptional capability of the F-15C, and their prowess in air-to-air engagements.

F-15Cs executed 5,667 sorties and were responsible for 35 of 43 Coalition air-to-air kills, only five of which were against MiG-29s.[11] Iraqi pilots crashed two of these aircraft, impacting the ground while evading American F-15Cs.[12] Further, Royal Saudi Air Force F-15Cs accounted for two additional Iraqi kills. In the OCA/DCA role, F-15Cs provided sweep cover in advance of attack and bomber strikes, flew combat air patrols to ensure continued air dominance over KTO and Iraqi airspace, and provided point protection for high-value airborne assets, such as the E-3 Airborne Warning and Control System (AWACS) and E-8 Joint Surveillance and Target Attack Radar System (JSTARS). F-15Cs were so successful in these missions that the Iraqi Air Force ultimately declined to fight, hiding their aircraft on the ground rather than risking destruction in the air. Post-war estimates indicate that 141 Iraqi pilots flew their aircraft into Iran rather than engage the Coalition aircraft in the air, allowing other Coalition air assets to act with relatively impunity in carrying out their missions.[13]

Conventional Attack

Of the 554 A-10s in the inventory, 132 of the 338 combat coded A-10s deployed, for a deployment rate of 34%. A-10s flew 7,428 sorties over the course of the conflict, losing four aircraft to hostile fire, the most losses for any of the Air Force aircraft involved. Besides traditional close-air-support missions, providing aerial attack at the immediate request of Coalition ground forces in contact with enemy troops, A-10s were used to

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[10] Eliot A. Cohen, *Gulf War Air Power Survey: Volume IV: Weapons, Tactics, and Training and Space Operations,* (Washington, DC: Government Printing Office, 1993), 34.

[11] Coyne, *Airpower*, 51.

[12] Cohen, *GWAPS: Vol. V*, 653-654.

[13] Andrew Leyden, *Gulf War Debriefing Book: An After Action Report* (Grants Pass, OR: Hellgate Press, 1997), 112; Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey: Summary Report* (Washington, DC: U.S. Government Printing Office, 1993), 193.

take advantage of Iraqi operational doctrine in 125 OCA and suppression-of-enemy-air-defense (SEAD) strikes. Since Iraqi pilots were not trained to autonomously seek out Coalition aircraft, instead relying on ground control intercepts to direct them to their targets, A-10s were used in an OCA role to destroy Iraqi "electronic warfare and ground control intercept" sites, and surface-to-air missile emplacements.[14]

With only 20 Air Force AC-130s in the inventory, four of the seventeen combat-coded AC-130s deployed, completing an impressive 104 sorties between them. Typically flying at night, the Spectre Gunships provided directed fire for "close air support, special operations support, and on-call air interdiction missions."[15] The loss of Spirit 03, the last of three Gunships supporting Marines in the Battle of Al Khafji, accounted for the single greatest loss of Air Force personnel in the war. On 31 January 1991, an Iraqi soldier shot it down with a man-portable surface-to-air missile (MANPAD), killing all fourteen Airmen aboard.[16]

While the F-15C was dominant in establishing and maintaining air superiority, the Air Force's workhorse during Desert Storm was its new multi-role fighter, the F-16 Fighting Falcon. At the time, the Air Force inventory consisted of 1,613 F-16s. With 249 aircraft in theater, the deployment rate for the 968 combat-coded F-16s was 26%. Despite the fact that nearly 200 of the 249 F-16s were day-only at this time and that no F-16 variants were capable of employing laser-guided precision munitions, F-16s conducted13,087 sorties. In addition to striking 11,698 targets in Iraq and Kuwait, F-16s acted as armed reconnaissance to coordinate air strikes by other assets against targets of opportunity. During the conflict, three F-16s were lost due to enemy action, while another five were lost in non-combat-related accidents.[17] While F-16s

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[14] Cohen, *GWAPS: Vol. IV*, 53.
[15] Cohen, *GWAPS: Vol. IV*, 118.
[16] Keaney and Cohen, *GWAPS: Summary*, 20.
[17] Cohen, *GWAPS: Vol. IV*, 49.

also flew 1,276 DCA and OCA missions, the Air Force was able to reduce the number of F-16s required for air superiority due to the inclusion of the F-15 Eagle to handle the majority of the OCA and DCA missions.

Precision Attack

The F-111F, F-15E, and F-117 aircraft were the only Air Force aircraft capable of employing laser-guided precision munitions. They accounted for the 4,086 laser-guided bombs (LGB) dropped by the Air Force in ODS.[18] Importantly, the F-111E aircraft, of which 26 of the 79 remaining deployed, were unable to employ LGBs. Deployment rates for the F-111Es were 33% for the 63 remaining combat-coded aircraft, far lower than for the F-111F variant, though they did make significant contributions in the execution of 458 sorties.

As the focus of the campaign shifted to Phase III, from strategic targets and Iraqi air forces to Iraqi fielded forces, the F-111Fs demonstrated another capability that fundamentally changed the character of American airpower employment, "tank plinking." Operators discovered that F-111Fs, joined later by F-15Es, could destroy Iraqi armor much more effectively using GBU-10/12 laser guided weapons than by attempting to do so by carpet-bombing an area with B-52s. These tank-plinking missions accounted for 1,804 strikes. In all, 64 of the 66 combat-coded F-111Fs deployed for a use rate of 96%. F-111Fs flew 2,423 sorties and were responsible for 46% of the Air Forces LGB strikes. To prevent an environmental and economic catastrophe, F-111Fs used LBGs to destroy a Kuwaiti oil-pump manifold that the Iraqis had sabotaged to spew crude oil into the Persian Gulf.[19] In addition to their capability for precision strikes, the comparatively long endurance of F-111Fs alleviated the need for air refueling support.[20]

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[18] Leyden, *Gulf War*, Table 11.3, 196.
[19] DoD, *CPGW*, 788.
[20] Cohen, *GWAPS: Vol. IV*, 43-44.

The newest aircraft to the Air Force inventory, the F-15E Strike Eagle, was deployed though its operational readiness certification had occurred only months prior to Desert Storm. The need for an LGB-capable multi-role fighter drove the deployment of two squadrons, accounting for 48 of 75 combat-coded aircraft. Still in the process of integration, the Low Altitude Navigation and Targeting Infrared for Night (LANTIRN) pod-mounted targeting capability, upon which its precision weapons depended, was not complete. The Air Force completed final integration and testing of the LANTIRN pods, which shipped after the F-15Es deployed, in theater.[21] In addition to air interdiction, strategic bombing, OCA, and SEAD, the F-15Es supplemented the F-111Fs in tank plinking, executing 1,700 strikes during 2,172 total sorties. Their mission-capable rate was 85.9%, with only two combat losses.

The final precision attack aircraft was the recently declassified F-117 Nighthawk stealth fighter. Truthfully, nothing about this aircraft classifies it as a fighter, since it possesses neither air-to-air weapons, nor a gun. However, its ability to approach, attack, and depart a target at night without escort makes it exceptionally capable. Carrying only two LGBs each, F-117s executed 1,299 sorties. They accounted for only two percent of the total attack sorties, but 40% of the attacks on Phase I and II targets. With only 36 aircraft combat-coded, the deployment of 42 of 55 TAI was well in excess of the programmed rate. Despite being responsible for the most heavily defended targets, it was the only aircraft to strike targets in downtown Baghdad. No F-117s were lost or damaged due to air defenses, or for any other reason.[22]

Electronic Attack

Desert Storm was, in many ways, the first cyber war. This is not to say that cyber was not part of previous conflicts, but rather that the US Air Force-led Coalition air forces incorporated SEAD and electronic

[21] Cohen, *GWAPS: Vol. IV*, 46.
[22] DoD, *CPGW*, 790.

attack as part of an integrated approach to disrupt and disable the Iraqi national-level air defense system.[23] Electronic warfare was an integral part of nearly every aircraft sortie, as well as a significant enabler for ground and naval forces. Using dedicated electronic warfare platforms, the Air Force utilized four main aircraft to provide electronic attack: F-16 Wild Weasels (F-16WW), F-4Gs, EF-111s, and EC-130Hs.

Of the 249 F-16s discussed previously, 12 F-16 WWs protected strike sorties in addition to their primary SEAD mission of utilizing high-speed anti-radiation missiles (HARM) to target Iraqi radar sites. While deployment rates for the entire F-16 fleet were 26%, the twelve F-16WW aircraft accounted for nearly 75% of their variant's combat-coded capability.[24]

As was true of other Vietnam-era aircraft, the Air Force was rapidly retiring F-4Gs as the F-16 WW aircraft came on line. However, the SEAD requirements for Desert Storm vastly outstripped the capability of the limited F-16 airframes yet available. Further, it was believed at the time that the French-designed Iraq air-defense network was one of the most capable and robust systems outside of the United States and Soviet Union.[25] With 99 TAI remaining, 66 of 72 combat-coded F-4Gs deployed for a rate of 92%. F-4Gs carried out 2,683 sorties in escort and autonomous roles, losing one aircraft to enemy fire during the conflict. One of the F-4Gs greatest limitations was its high fuel consumption,

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[23] Keaney and Cohen, *GWAPS: Summary*, 240.

[24] Murray, *Air* War, 42.

[25] DoD, *CPGW*, 52; Rebecca Grant, "Desert Storm," Air Force Magazine, Vol. 94, no.1, January 2011. Iraq's integrated air defense system, designed by French and Swedish companies, was considered highly modern. CPGW stated the IADS was "formidable, combining the best features of several systems. The multi-layered, redundant, computer-controlled air defense network around Baghdad was denser than that surrounding most Eastern European cities during the Cold War, and several orders of magnitude greater than that which had defended Hanoi during the later stages of the Vietnam War. If permitted to function as designed, the air defense array was capable of effective protection of key targets in Iraq."

requiring multiple air-to-air refuelings for every sortie and thus constant tanker availability.[26]

Aside from F-4G and F-16WW sensor-shooter aircraft, EF-111s provided jamming and SEAD capability for those aircraft that did not possess the organic ability to do so.[27] Of the 42 EF-111s in the Air Force inventory, only 24 were combat-coded. All 24 of these aircraft deployed, executing 1,105 sorties, and losing only one aircraft to enemy action. Post-war analysis by the Air Force Electronic Warfare Center determined that "Iraqi abilities to detect, track, and pass target information were seriously impaired and in some cases completely denied" when EF-111s supported Coalition aircraft.[28]

Finally, EC-130s provided electronic attack as well as command, control, and communications (C3), and psychological operations. In 1990, the Air Force inventory included 30 EC-130 aircraft. Of these, 26 deployed, two more than were considered combat-coded. Eighteen of these EC-130s were EC-130H Compass Call variants, designed to "disrupt the enemy's [C3] and thus reduce his ability to wage warfare." They flew 450 sorties.[29] The remaining eight were tactical C3 or psychological operations aircraft, which flew an unspecified number of missions.

Bombers

At the time of Desert Storm, there were only two bombers active in the Air Force inventory, since the B-2 Spirit was not yet operational. Additionally, the Air Force did not employ any of its 96 B-1B aircraft. Designed and produced for a Cold War nuclear deterrence mission,

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[26] Cohen, *GWAPS: Vol. IV*, 92; DoD, *CPGW*, 777.

[27] "Sensor-to-Shooter" refers to the need for sensor aircraft (those with imagery or electronic intelligence) to pass targeting information to shooters. F-4G and F-16WW are among the first "sensor-shooter" aircraft, since they could identify enemy radar sites targeting them and attack them with electronic and kinetic means. EF-111s had no ability to kinetically target enemy radars, relying solely on electronic attack.

[28] Cohen, *GWAPS: Vol. IV*, 96.

[29] Cohen, *GWAPS: Vol. IV*, 96.

neither the aircraft nor aircrews had been prepared to employ conventional munitions effectively prior to Desert Storm.[30]

While the F-16 was the workhorse in terms of total sorties, B-52G aircraft delivered the largest percentage of munitions. To support all phases of the air campaign, 30 of 33 conventional B-52G aircraft were deployed, 91% of the combat-coded force. Thirteen aircraft participated in the opening-night attack, with seven taking off from Barksdale AFB, LA, on a 35-hour long 14,000-mile trip to launch 35 conventional air-launched cruise missiles (CALCM) programmed to attack eight targets.[31]

While lacking precision-weapons capability, B-52Gs dropped 72,000 bombs weighing 27,000 tons, nearly 30% of the total tonnage dropped, despite their 1,741 sorties accounting for only 3% of total attack sorties flown.[32] One aircraft sustained battle damage, though it was able to return safely, while another B-52G was lost due to aircraft malfunction.

Mobility: Tankers & Transport

While tactical and bomber aircraft devastated the Iraqi military, tanker and transport aircraft played vital roles in the war. In order to expedite arrival of US Air Force air-defense aircraft in Saudi Arabia with the hope of discouraging Iraq from invading, the initial F-15Cs required seven en-route air refuelings to fly non-stop from Langley AFB, VA.[33]

Tankers supported nearly every aspect of the Gulf War. The initial Desert Shield buildup required more than 100 tankers for an air bridge, rapidly transporting over 1,000 aircraft to theater. Once Phase I of Desert Storm began, the long distances aircraft had to travel due to lack of bases close to the KTO (see Figure 1) required 275 tanker sorties in 60 air-refueling tracks. With "nearly 60 percent of the wartime sorties by

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[30] Cohen, *GWAPS: Vol. IV*, 121-122.
[31] DoD, *CPGW*, 764.
[32] DoD, *CPGW*, 764; Cohen, *GWAPS: Vol. IV*, 52.
[33] Murray, *Air* War, 11.

aircraft capable of being refueled" requiring tanker support, nearly 17,000 total tanker sorties were flown, most resulting in multiple receiver aircraft for any given tanker.[34]

Aircraft	Combat Radius	Target Distance
F-117	550 nm	to Baghdad—905 nm
F-15E	475 nm	to Western Scud areas—680 nm
F/A-18	434 nm	Red Sea Carrier to Kuwait City—695 nm
B-52G	2,177 nm	Diego Garcia to Kuwait—2,500 nm

Figure 1: Aircraft Bed-down to Target Distances

Source: Keaney and Cohen, GWAPS: Summary, 228.

With such a demand for air refueling, both KC-10A Extender and KC-135 Stratotanker aircraft were in high demand. As just one example, the seven B-52Gs that fired the conventional air-launched cruise missiles in the opening salvo required five air refuelings to make their 14,000-mile round-trip flight. These five refuelings utilized thirty-eight KC-135s and nineteen KC-10s.[35] Initially, planners anticipated using thirty KC-10s for dedicated cargo airlift missions; however, the unrelenting demand for air refueling required use of KC-10 and KC-135s for airlift and air refueling roles. Of 635 KC-135 TAI, 262 of 544 combat-coded aircraft deployed for a use rate of 48%. KC-135s flew nearly 23,000 sorties, to include 913 airlift sorties, delivering 136 million gallons of fuel to over 69,000 receiver aircraft. Ultimately, 46 of 59 TAI KC-10s deployed, 81% of 57 combat-coded aircraft.

The demand for air refueling was not limited to Air Force aircraft, as nearly 12 percent of the fuel delivered and 17 percent of the sorties flown supported US Navy or US Marine Corps aircraft. The buildup of aircraft and personnel as part of Desert Shield stretched air refueling

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[34] Keaney and Cohen, *GWAPS: Summary*, 228.

[35] Eliot A. Cohen, *Gulf War Air Power Survey: Volume II: Operations and Effects and Effectiveness.* (Washington, DC: Government Printing Office, 1993), 140.

logistical capabilities, requiring over 17,000 sorties to refuel 33,000 receiver aircraft with nearly 70 million gallons of fuel. The execution of the air campaign in Desert Storm pushed the system even further as the combined KC-135 and KC-10 effort accounted for 15,000 air refueling sorties to refuel 52,000 aircraft with 125 million gallons of fuel. According to the *Final Report to Congress: Conduct of the Persian Gulf War*, "Nearly every aircraft that was capable of air refueling did."[36]

In addition to air refueling, massive access to airlift was required to deploy troops and cargo. C-5s, C-141s, and commercial carriers flew the bulk of the nearly 16,000 strategic airlift missions. As mentioned previously, KC-10s were also used to supplement the airlift, flying 379 of these missions. C-5 commit rates exceeded combat-coded capacity with 118 of 126 TAI being utilized, nine aircraft above combat-coded thresholds. This required the suspension of nearly all at-home training as well as most preventive maintenance, delaying thorough inspections until after the conflict was over. Likewise, 195 of the 265 TAI C-141s were used, 83% of combat-coded capability. Mission-capable rates were 70% for C-5s and 80% for C-141s.

In total, C-141s accounted for 9,085 missions, moving 323,595 tons of cargo and 93,126 passengers. C-5s flew 3,980 missions, moving 201,840 tons and 1,111 passengers.[37] Recognizing the size of the task, United States Transportation Command activated the first stage of the Civil Reserve Air Fleet (CRAF) on 17 August, providing "18 long-range international (LRI) passenger aircraft and crews and 21 LRI cargo aircraft and crews."[38] Activation of the second stage on 17 January provided an additional 59 passenger and 17 cargo aircraft.[39] The CRAF combined to

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[36] DoD, *CPGW*, 484.
[37] Leyden, *Gulf War*, 62.
[38] DoD, *CPGW*, 491.
[39] DoD, *CPGW*, 483.

provide another 3,813 missions, moving 594,730 tons of cargo and 509,129 passengers.

Within the KTO, the C-130 accounted for nearly all the Air Force's tactical airlift. With 168 of 568 TAI deployed, the Air Force had 36% of its combat-coded aircraft in theater. This is even more significant given that 58% of the Air Force's C-130 aircraft were in the ANG or Reserves. Kept extremely busy, the ninety-six C-130 aircraft deployed before November had already flown more than 8,000 sorties by the end of December.[40] By the time the conflict was over, C-130s had flown 13,971 sorties.[41]

Intelligence, Surveillance & Reconnaissance

The integration of numerous ISR platforms focused on tactical, operational, and strategic objectives allowed the Coalition to "monitor and control the battle area [confirming] the Iraqi's [*sic*] ignorance of what Coalition forces were doing."[42] While space assets also contributed to this endeavor, the focus here is on those assets operating within the earth's atmosphere. These aircraft provided critical data to commanders and planners by operating either as command, control, and communications (C3) assets or as ISR collectors.

On the C3 side, four additional aircraft types joined the EC-130s to provide nearly all the coordination and control of Coalition assets over the KTO. For tactical C3, OA-10s supplemented the F-16s, conducting tactical armed reconnaissance C3 missions. Of the 26 OA-10s in the inventory, 12 were deployed, 57% of the 21 combat-coded aircraft. In the execution of 656 sorties, two of the twelve deployed aircraft were lost to enemy action.

Additionally, E-3 Airborne Warning and Control System (AWACS) and E-8 Joint Surveillance and Target Attack Radar System (JSTARS)

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[40] DoD, *CPGW*, 493.
[41] Keaney and Cohen, *GWAPS: Summary*, 184.
[42] DoD, *CPGW*, 223.

provided a nearly complete air and ground picture to most Coalition command centers. Of the 34 AWACS in the Air Force inventory, 14 deployed aircraft flew 379 sorties. In order to provide a robust ground picture, the Air Force deployed the only two E-8 JSTARS aircraft it had at the time. The E-8 was still a developmental system, currently going through operational test and evaluation. With few Air Force personnel qualified to operate the system, most of its crew were contractors from the company that was developing the technology. These two developmental aircraft flew 54 sorties and "teamed with the F-15Es, F-16s, and F-111s [to deny] the enemy its night sanctuary."[43]

In addition to numerous satellite-based imaging systems, the Air Force used five main ISR aircraft. In addition to the AWACS and JSTARS systems, whose primary function was operational C3 as discussed, RF-4C, RC-135, and U-2/TR-1 aircraft provided pre-strike targeting intelligence, real-time situational awareness, and post-strike battlefield damage assessment (BDA). The Air Force deployed 24 of its aging RF-4C aircraft, accounting for 16% of the combat-capable aircraft at the time. All retired only five years later. RF-4Cs flew 822 sorties, providing post-strike BDA, though "air and ground commanders were frustrated at times by the delay between imaging and delivery for interpretation."[44]

For signals intelligence (SIGINT), the Air Force deployed 11 of its 19 TAI RC-135 Rivet Joint aircraft, 73% of its combat capability, the first arriving in theater on 9 August, only a week after the invasion of Kuwait. These SIGINT platforms flew 197 sorties. Additionally, the U-2/TR-1 aircraft provided imagery intelligence (IMINT) utilizing nine total aircraft and executing 238 sorties. The exact inventory of these highly classified aircraft during this period is not available.

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[43] DoD, *CPGW*, 508.

[44] Cohen, *GWAPS: Vol. IV*, 100-101.

Summary

In contrast to conventional wisdom, prosecution of Desert Storm occupied a considerable percentage of USAF aircraft. While the demands on fighter and attack aircraft appear reasonable, close evaluation reveals significant disparity in the usage rates across the fleet as a whole. Those aircraft with unique capabilities had less excess capacity than did legacy multi-mission aircraft. In the coming years, the Air Force would seek to provide enhanced capability to multi-mission aircraft through the incorporation of modular enhancement such as targeting, surveillance, or electronic-attack pods.

While only 30% of the fighter/attack and bomber aircraft deployed, deployment rates for aircraft capable of electronic and precision attack were significantly higher. Those aircraft capable of electronic attack (EC-130, EF-111, F-4G, and F-16WW) combined for an 84% deployment rate, with EC-130s being deployed in excess of 100%. Likewise, aircraft capable of precision attack with laser-guided munitions (F-111F, F-117, and F-15E) combined for a 73% deployment rate. This capability was in such demand that F-15Es accomplished operational testing of LGB targeting in theater. Similarly, 91% of the conventional combat-coded B-52Gs were used in Desert Storm. Combined, these tactical aircraft contributed to 34 air-to-air kills and the destruction of over 50% of Iraqi armor by airpower prior to the ground offensive.[45]

The effectiveness of American airpower against Phase I, Phase II, and 1,804 Phase III tank-plinking targets led Max Boot and others to suggest that airpower prevented a traditional war of attrition, leading to the adoption of a new American way of war. Carl Conetta's 2003 *Project on Defense Alternatives* study estimated Iraqi combat-related deaths at 20,000 military and 3,663 civilians, numbers that are in line with those

[45] Leyden, *Gulf War*, 193-198. Leyden estimates 2,435 of 4,280 tanks, 1,443 of 1,880 APCs, and 1,649 of 3,100 artillery pieces were destroyed by airpower before the ground offensive began.

in the Gulf War Airpower Survey.[46] Additionally, the air war resulted in 149 American and 78 Coalition combat-related fatalities. While no war will be without death, airpower as applied in Desert Storm minimized the friendly and collateral casualties that normally accompany attrition warfare.

The casualty numbers of Desert Storm stand in stark contrast to previous conflicts. For comparison, R.J. Rummel, a political science professor who has studied war deaths, estimates total deaths in the Korean War at 2.5 million between 1950 and 1953, and 1.8 million in Vietnam between 1960 and 1975. In each case, these totals include over 50,000 United States military personnel.[47] While airpower alone cannot claim sole credit for these differences, such disparity is indicative of a fundamental change in the character of the prosecution of the war. Overwhelming airpower made a significant contribution to this remarkable asymmetry. The question is how much capability the United States possessed to wage this type of war.

As was discussed earlier, National Security Strategy 1990 attempted to articulate the role of the United States with respect to regional security issues in light of the collapse of the Soviet Union. The corresponding 1990 National Military Strategy Document, a classified precursor to what is now the National Military Strategy (NMS), was intended to define how the Department of Defense was to organize, train, and equip its forces. Just two years later, in 1992, the first unclassified NMS articulated a requirement to execute two regional, major contingency operations. Desert Storm was one such operation.

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[46] Carl Conetta, *The Wages of War: Iraqi Combatant and Noncombatant Fatalities in the 2003 Conflict*, Project on Defense Alternatives, Research Monograph #8, 20 October 2003, Appendix 2. http://www.comw.org/pda/0310rm8ap2.html (accessed 25 February 2012); Keaney and Cohen, *GWAPS: Summary*, 249.

[47] R.J. Rummel, *Statistics of Democide: Genocide and Mass Murder since 1900 (*New Jersey: Transaction Publishers, 1997), Tables 6.1A and 10.1. http://www.hawaii.edu/powerkills/SOD.TAB6.1A.GIF and http://www.hawaii.edu/powerkills/SOD.TAB10.1.GIF (accessed 23 April 2012).

Desert Storm required 84% of electronic attack aircraft, 73% of the precision weapons capable aircraft, and 91% of the conventional weapons capable bombers. Additionally, the Air Force utilized 91% of its strategic airlift aircraft and drew second stage supplementation from the Civil Reserve Air Fleet. Had the United States been required to fight another major contingency operation, it would not have looked anything like Desert Storm. Insufficient tactical assets would have been available to suppress enemy air defenses. Further, with the demands placed on the mobility airlift fleet, it is unlikely a sufficiently sized force would have been able to get to wherever they were required.

Chapter 2

Air Force – 2010

War has changed and so has the Air Force. Although our fundamental beliefs remain sound, the evolution of contingency operations, the rapid maturation of space and information warfare, and the leveraging power of information technology have transformed the effectiveness of air and space power.

General John P. Jumper
17TH Chief of Staff of the U.S. Air Force

The twenty years between Desert Storm and 2010 witnessed a significant evolution in the capability of the US Air Force. Consideration of the Air Force lessons learned in and after Desert Storm, and how they affected decisions contributing to the force structure of 2010, will suggest what the Air Force might look like in 2030. Desert Storm provided potential enemies with a frightening demonstration of the Air Force's operational capability, a precursor to Max Boot's ideation of a *new American way of war.*[1] It demonstrated, according to Benjamin Lambeth, that "airpower, properly applied, can now quickly neutralize enemy armies and surface navies anywhere."[2]

In the twenty years following Desert Storm, the US Air Force refined the ability to precisely target and engage armor and personnel. No longer a niche capability requiring a preponderance of specialized aircraft, delivery of precision munitions became the de facto standard of American attack. The combination of stealth, precision munitions, and enhanced battle space awareness, resulting from the integration of

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Epigraph – United States Air Force, *Air Force Basic Doctrine Document 1* (17 November 2003), i.

[1] James Forsythe, SAASS, in discussion with author, 29 September 2011. Dr. Forsythe related a conversation he had with Russian Air Force personnel in the early 1990s, following Desert Storm, and their shock and amazement at the rapid aerial dismantling of the Iraqi military.

[2] Benjamin S. Lambeth, *The Transformation of American Airpower* (Ithaca, NY: Cornell University Press, 2000), 309.

intelligence and command, control, and communication functions, provided American airpower with the ability to find, fix, track, target, and precisely engage targets, previously the near exclusive domain of land forces. Not simply an evolution of capability, this revolution reduced collateral damage while simultaneously increasing the lethality of attack aircraft and minimizing risk to American personnel. Ruehrmund and Bowie estimate the improvements in precision due to munitions and aircraft electronic systems increased the number of targets a single attack aircraft could destroy by "13 to 26 times."[3]

To suggest that the wars in Afghanistan and Iraq compare with the force required in Desert Storm is fundamentally to misunderstand the nature of these conflicts. Neither of these conflicts, despite requiring a significant commitment of money, equipment, and personnel, is of the scope and size that a force-on-force scenario like Desert Storm required. In discussing the status of the Air Force combat forces in 2010, the focus will be on the quantity and capability of modern Air Force aircraft as compared with the Cold War-aircraft of 1990. All estimates are based on notional, unclassified approximations of force needed, not deliberate planning, with significant assumptions required to facilitate the use of this thesis as a starting point for discussion.

The attempt to estimate the 2010 USAF-force structure required for a conflict like Desert Storm is included at Appendix B, based on the assumption that opposing Iraqi military capability existed as it did in January 1991, prior to initiation of Phase I of Desert Storm. Further, it assumes ODS2, occurring in 2010, would have been the sole major contingency operation required by National Security Strategy 2010 as discussed below. Had Desert Storm occurred in 2010, would the Air Force have been capable of executing the air campaign, while still

[3] James C. Ruehrmund, Jr. and Christopher J. Bowie, *Arsenal of Airpower: USAF Aircraft Inventory 1950-2009* (Washington, DC: Mitchell Institute Press, 2010), 10-11.

meeting the remainder of its commitments as required by the 2010 United States National Security Strategy?

National Security Strategy 2010

Just as NSS 1990 was the first of President George H. W. Bush's presidency, NSS 2010 was the first for President Barack H. Obama. The end of the Cold War, stabilization of relations with a resurgent Russia, lack of a counter-balancing super power, and the September 11, 2001, terrorist attacks on the American homeland resulted in an American national security policy dramatically different from that of 1990. Where the 1990 document called for a capability to engage in two regional, major, contingency operations (MCO) simultaneously, the 2010 NSS required the military establishment "to defend the United States in a wide range of contingencies against state and non-state actors."[4]

This official shift in strategic focus came as President Obama's administration worked through the lessons of the previous twenty years. The DoD's 2010 Quadrennial Defense Review (QDR) argued that the two-MCO construct was not flexible enough for the next decade's dynamic security environment, proposing a "1-4-2-1 strategy": 1 - defend the homeland; 4 – deter conflicts with forward deployed forces in *four* major regions [4 holding actions, i.e. Korea]; 2 - halt aggression in *two* regions simultaneously [2 blunting operations, i.e. Horn of Africa]; and 1 - decisively defeat an adversary in *one* of those theaters [one MCO].[5] Rather than preparing for a force-on-force battle that appeared increasingly unlikely given the massive conventional superiority enjoyed by the US military, the QDR articulated the DoD's need to "be prepared to support broad national goals of promoting stability in key regions,

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[4] The White House, *The National Security Strategy of the United States*, May 2010, 14. http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf (accessed 7 December 2011).

[5] United States, Congressional Research Service, *Quadrennial Defense Review 2010: Overview and Implications for National Security Planning* (R41250, May 17, 2010), by Stephen Daggett, 22.

providing assistance to nations in need, and promoting the common good."[6] The DoD's 2010 QDR institutionalized what the Air Force and others had already come to know to be true: future force structure must allow flexibility to engage a variety of threats.

USAF Budget and Manpower

Subsequent to Desert Storm and the promise of what George H.W. Bush had called a "new world order" resulting from the collapse of the Soviet Union, the United States implemented a significant reduction in the funding and personnel strength of the armed forces. Federal defense budgets declined from $303B in 1990 to a low point of $263B in 1994. Total DoD manpower was reduced from 3.2 million personnel in 1990 to 2.2 million by 1997, a level it has essentially continued since then.[7] This *peace dividend* from the end of the Cold War had a significant impact on Air Force force structure.[8] In the twenty years in question, Air Force manpower declined thirty percent, from 1.06 million in Desert Storm to 736 thousand in 2010.[9] Some 507 thousand were on active duty, 34% of whom were civilians, the highest percentage ever of civilian to uniformed military in the Air Force history. Another series of personnel cuts and reforms reduced active-duty, uniformed Air Force personnel to 334 thousand, the least in the history of the Air Force. Congress reduced military spending as well.

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[6] Department of Defense, *Quadrennial Defense Review Report,* February 2010 (Washington, DC: Government Printing Office, 2010), iii.

[7] Department of Defense, *National Defense Budget Estimates for FY 2012*, prepared by the Office of the Under Secretary of Defense (Comptroller) (Washington, DC: Government Printing Office, 2011), 233-234.

[8] Michael D. Intriligator, "The Peace Dividend: Myth or Reality?" in *The Peace Dividend: Contributions to Economic Analysis,* ed. by Nils P. Gleditsch (Amsterdam: Elsevier Science, 1996), 1-2. Intriligator describes the *peace dividend* as "a concept that has been used to refer to the benefits derived from lower defense spending and the conversion of military production into civilian production."

[9] United States Air Force, *Statistical Digest:* (various years). *USAF* Total Force manpower includes the Active Force (uniformed and civilian) and the Air Reserve Forces (USAF Reserve and Air National Guard).

Since Desert Storm, overall growth of defense outlays has outpaced inflation, rising from $299 billion in 1990 ($492 billion in 2010 dollars) to $693 billion in 2010. Averaging across twenty years tells only part of the story, however. In the drawdown following Desert Storm, Congress decreased annual federal defense spending 12% from 1990 to 1996, from $299 to $265 billion, a 26% reduction adjusted for inflation. It was not until 2002, due to operations in Afghanistan and later Iraq, that federal defense spending began to outpace inflation. Comparing 1990 to 2001, budgets cuts and inflation had resulted in a $100 billion loss in buying power annually. With non-defense spending continuing to grow, federal defense shrank from 23.9% to 16.5% of total government outlays, a reduction from 5.2% to 3.0% of GDP, the lowest level since prior to World War II.[10] Since the trough in 2001, defense outlays have again risen, peaking at $693 billion in 2010, 18.2% of federal outlays and 4.8% of GDP.

Air Force spending took an even greater hit. By 1996, Congress had reduced Air Force outlays from $93 to $75 billion annually, a 33% reduction when adjusted for inflation. Further, Air Force apportionment of federal defense outlays declined from 31% to 27% by 2001. Even with substantial growth in federal defense outlays since 2001, Congress has allocated the Air Force a lesser percentage of those increases. Air Force outlays have barely kept ahead of inflation when averaged across the twenty-year span. Many consider the 1990s a lost decade, since the loss of buying power handicapped Air Force efforts to invest in new aircraft. In an effort to do more with fewer, rapidly aging aircraft, Air Force leadership invested heavily in those areas that promised the highest dividends: research and development of next generation stealth technology, precision weapons, and net-centric warfare. This has shaped

[10] Robert M. Coen and Bert G. Hickman, "Macroeconomic Impacts of Disarmament and the Peace Dividend in the US Economy," in *The Peace Dividend: Contributions to Economic Analysis*, ed. by Nils P. Gleditsch (Amsterdam: Elsevier Science, 1996), 55-57.

today's force structure, which, while extremely capable, will eventually need replacement.

Operational Aircraft Inventory

Just as USAF manpower experienced significant contraction, so too did total aircraft inventory (TAI). The replacement of fighter and attack aircraft with multi-role variants, reduction of the bomber fleet in light of a changed security environment, and corresponding reduction of airlift and air refueling capacity contributed to a 41% reduction in total aircraft inventory from 8,907 to 5,231. Within these cuts, fighter and bomber fleets were disproportionately affected. Also of note, cuts were not proportional across active-duty, Reserve, and Air National Guard forces. In the cases of airlift and air refueling, the Air Force moved capacity from the Active Force to the ANG and Reserve, increasing their fleet sizes at the expense of active duty force structure. By 2010, the 5,231 TAI aircraft included 3,731 Active Duty, 405 Reserve, and 1,095 Air National Guard.

Tactical Air Forces

By 2010, the Air Force was conducting extended operations in Iraq and Afghanistan with a fleet of 2,067 TAI fighter and attack aircraft. This fleet constituted less than half of the 4,227 attack aircraft TAI available when Desert Storm was executed. Further, it was 600 aircraft fewer than the total combat-coded aircraft fleet from which the Desert Storm force was drawn. Multi-role aircraft with advanced sensor suites and improved munitions replaced older aircraft designed for either electronic or kinetic attack. Effectively six aircraft variants had been retired, with their capabilities incorporated into existing aircraft in the form of external pods.[11] Between 1990 and 2010, the Air Force

[11] Advanced electronic warfare and ISR pods incorporated onto the A-10, F-15, and F-16 variants effectively replaced the capabilities lost with the retirement of the A-7, EF-111, F-4G, F-111E, F-111F, and RF-4.

introduced only two new tactical aircraft into the operational inventory, the F-22A and the MQ-9.

Air Superiority Fighter

For the air-superiority mission, the Air Force added a new fighter aircraft that could out-perform any other in the world. The F-22A Raptor combined in a single platform the lessons the Air Force had learned regarding stealth, precision weapons, and exploitation of the electronic spectrum, both in data collection and pilot situational awareness. The Air Force established the requirements for what would become the F-22A in 1981, calling it the Advanced Tactical Fighter (ATF) competition. It was to incorporate cutting-edge and future technologies as a replacement to the F-15 in order to defeat emergent Soviet fighter designs, as well as new surface-to-air missile-defense systems. Reaching initial operating capability in 2005, the Raptor first demonstrated its capabilities at Alaska's Exercise Northern Edge in June 2006. Twelve F-22A pilots downed 108 adversaries in simulated combat without a single loss. During the two-week exercise, the F-22A-led blue force accounted for 241 total kills with only two losses, neither of which was a Raptor.[12]

However, as capable as the F-22A has proven to be, it has always been in short supply. In 2010, the Air Force had a TAI of 158 F-22As, with 120 combat-coded aircraft. Intending the F-22A as a near one-to-one replacement for 874 air-superiority F-15s, the Air Force planned to acquire 750 ATFs starting in 1994. The program was handicapped from the start, even before Congress slashed the post-Desert Storm budget. Before the Air Force had even chosen which of two competitors would be produced, the 1990 Major Aircraft Review led by Secretary of Defense Richard Cheney reduced the ATF purchase to 648 aircraft beginning in 1996. Later reduced to 438 aircraft beginning in 2003, cost overruns

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[12] C.T. Lopez, "F-22 excels at establishing air dominance," *Air Force Print News*, 23 June 2006. http://www.af.mil/news/story.asp?storyID=123022371 (accessed 21 March 2012).

and production problems led Secretary of Defense Donald Rumsfeld to cap production at 187 aircraft, despite the Air Force's insistence on the need for 381.[13] By 2010, F-22As had effectively replaced all 353 F-15 A/Bs as well as about half of the 417 F-15 C/Ds present in the fleet during Desert Storm. The replacement ratio ended up closer to 1-to-3 than the 1-to-1 the Air Force had initially desired.

With 254 F-15 C/Ds left in the Air Force inventory in 2010, the Eagle continues to be a formidable force in establishing and maintaining air superiority. The Air Force has upgraded the remaining 163 combat-coded F-15s with advanced avionics and weaponry, to include an active electronically-scanned-array (AESA) radar that provides enhanced ability to target and engage multiple aircraft at the same time.

As to the quality of the F-22As and F-15s in the Air Force inventory in 2010, there is little question that they are far superior to the F-15s present in 1990. The AESA radar and advanced air-to-air weaponry are significantly more capable, as the F-22A employment in the exercise in Alaska demonstrated. Deployment of 48 F-22As and 76 F-15s would provide the same number of air superiority fighters that planners required for Desert Storm.[14] This translates into 39% of the F-22A and 46% of the F-15 combat-coded inventory. While these percentages are higher than those used in Desert Storm, they are likely within the acceptable range for operations of this nature. Further, they leave in place those aircraft that are required for homeland defense and other contingency missions addressed in the 2010 NSS.

Full Spectrum Attack

While the F-22A is the embodiment of the lessons learned regarding stealth, precision, and electronic exploitation, the Air Force

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[13] Mel Williams, *Superfighters: The Next Generation of Combat Aircraft*. (London: AIRtime Publishing Inc., 2002), 22.

[14] 48 F-22As would allow force packages of 6-8 aircraft as suggested in Lopez's article, while 76 F-15s would allow for 19 4-ship packages.

sought to incorporate those capabilities into almost all attack platforms. Not only do these capabilities increase the ability to find, fix, track, target, engage, and assess (F2T2EA) conventional targets, they allow multi-role platforms to execute many missions without the traditional need for escorts or supporting aircraft. As a result, the Air Force was able to divest itself of many older aircraft. Already programmed for retirement, the 335 A-7 aircraft in the inventory in 1990 were in AMARC by 1993. Further, the 328 F-111 and EF-111 variants had been retired by 1997. Finally, the 58 F-117s, invaluable during the opening strikes of Desert Storm, had been retired by 2007, having reached the end of their programmed lifespan. Through the incorporation of upgrades to existing multi-role aircraft, the Air Force eliminated over 700 aircraft.

Since 1990, the Air Force has significantly upgraded and expanded to 25 TAI its fleet of AC-130 gunships. Eight of these gunships have been in service since Desert Storm with another seventeen being built from existing airframes since that time. Considered a low-density, high-demand asset, the AC-130 meets the Air Force requirement to provide precise firepower support to Special Operations ground teams. The aircraft's ability to loiter and adjust fire on request in all weather conditions makes them extremely valuable in both conventional and irregular warfare. In addition to advanced precision-weapons capability, modern AC-130s have enhanced data links to allow cross-cueing of video and targeting information with other aircraft and large aircraft infrared countermeasures to protect against heat-guided surface-to-air missiles (like the one that shot down Spirit 03 in Desert Storm). Additionally, upgrades include forward-looking infrared and all-light-level television to allow prosecution of attack operations day or night in adverse weather conditions.[15] The twenty-five AC-130s of 2010 are substantially more

[15] Susan H.H. Young, "2010 USAF Almanac: Gallery of USAF Weapons," *Air Force Magazine*, 93, no. 5 (May 2010), 129-130.

capable, as well as more survivable, than were the twenty gunships present in the inventory in 1990.

Likewise, the 334 A-10A/C aircraft in the 2010 inventory represent a significant advance over those of 1990. This upgraded A-10 is day/night capable with night-vision goggle compatibility, capable of employing precision munitions based on GPS-guidance or laser designation. It provides the pilot with enhanced integration of sensor and system data, and incorporates electronic-countermeasure systems to increase survivability against air defense threats. Because of problems with structural reliability, however, only 174 of 334 A-10 aircraft were combat-coded in 2010.

Like the F-15C air-superiority fighter, the F-15E has undergone significant enhancement since Desert Storm. As one of the newest weapons systems to participate in Desert Storm, it is also one of the few aircraft present in Desert Storm whose TAI has increase since that time. Since 1990, the Air Force has nearly doubled its F-15E fleet to 213 TAI, with 132 aircraft combat-coded. Already capable of precision-guided munitions in 1990, the Air Force upgraded the F-15Es with advanced imagery and targeting pods, as well as next-generation precision weaponry for reduced collateral damage and the latest air-to-air missiles.[16] With the growth in combat-coded airframes, deployment of 48 F-15Es in 2010 would have constituted only 36% of the combat-coded force.[17] Significant excess capacity existed to increase the number of deployed aircraft, thus likely reducing the number of multi-role F-16 fighters required, a percentage that in 2010 would have been much higher than the 26% required in Desert Storm.

Since 1990, upgrades to the F-16 Fighting Falcon have made it the world's premier multi-role fighter. Though optimized for air-to-ground attack missions, it is a capable air-to-air fighter as well. As discussed

[16] Young, "2010 USAF Almanac," 127-128.
[17] 48 F-15E were deployed in Desert Storm.

during Desert Storm, day-only capability and lack of precision munitions limited the majority of Air Force F-16s. The Air Force remedied those deficiencies through new software, avionics, and weapons upgrades. In 2010, the Air Force inventory consisted of four main variants of the F-16: C/D (Block 25), C/D (Block 30), CG (Block 40/42), and CJ (Block 50/52).[18] The Air Force upgraded all these aircraft for all-day/all-weather mission requirements. Truly multi-role, they are capable of air-to-ground precision attack using both GPS- or laser-guided weapons, and air-to-air beyond-visual-range intercept. Likewise, integration of advanced data links and podded electro-optical sensors allows cross-cueing of imagery and target information to and from other airborne platforms, as well as with supported ground personnel.

Desert Storm occurred in the fall of 1990 as the Air Force was transitioning the suppression-of-enemy-air-defenses (SEAD) mission between F-4G and F-16 aircraft. With only 99 F-4Gs available due to pending retirements, the availability of only sixteen combat-coded F-16WW aircraft hampered the Air Force SEAD capability. Improving upon the F-16WW Block 40 variant from Desert Storm, the Air Force's approximately 250 F-16CJ Block 50/52 aircraft now fulfill the SEAD role. But the Air Force took possession of its first Block 50/52 aircraft only in late 1991 after Desert Storm had ended.[19] Thus, Air Force SEAD aircraft in 2010 numbered nearly twice what they did in Desert Storm.[20] Further, since the F-16CJ also possesses the capability to deliver GPS- and laser-guided precision munitions, as well as the advanced imagery and targeting data links mentioned previously, it is vastly more capable in non-SEAD missions than were either the F-4G or F-16WW aircraft operated by the Air Force in 1990.

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[18] Young, "2010 USAF Almanac," 128.

[19] Young, "2010 USAF Almanac," 128.

[20] F-4Gs were being rapidly retired while the first F-16WWs were coming into service. In the fall of 1989, the Air Force listed 390 F-4G TAI. By fall 1990, that number was 164 and was further cut to 75 by the time Desert Storm was over.

While these new, upgraded F-16s embody the ideal set forth for multi-role capability, early versions of the F-16 have started to retire, leaving the Air Force with 1,004 of the 1,797 TAI it had immediately following Desert Storm. When considered in relation to the attack aircraft it replaced, however, F-16s technological displacement of the retired A-7, F-111, and older F-16s through 2010 resulted in the 57% reduction of attack platforms, not considering those that would be utilized for SEAD missions.[21] Within the SEAD mission set, the Air Force of 2010 was much more capable than was the force of 1990. Growth in F-16 SEAD capacity to 250 airframes would reduce the combat tasking rate to approximately 50% based on requirements for Desert Storm. Further, growth of other stealth aircraft capabilities, such as the B-2 Spirit discussed below, would likely reduce some SEAD targets through initial precision strikes.

If 76 dedicated F-16CJ SEAD aircraft were required, effectively equal to Desert Storm, 593 combat-coded F-16s would remain in the Air Force inventory. Deployment of 340 of these F-16s, the same as the combined total of F-16 and F-111s from Desert Storm, would equate to 57% of the remaining combat-coded F-16 aircraft. While significantly higher than the percentage deployed in Desert Storm, it is lower than Desert Storm deployment rates for those aircraft that were capable of employing precision munitions at that time. Additionally, concerted efforts to ensure air supremacy would allow for fewer F-16s by using follow-on remotely piloted attack aircraft such as the MQ-1 and MQ-9.

The newest attack aircraft operationalized by the Air Force by 2010 were the MQ-1 Predator and MQ-9 Reaper. While the Air Force procured the MQ-1 as an "armed reconnaissance" intelligence and surveillance asset, then weaponized it to strike opportune targets, the MQ-9 was

[21] From 1991 to 2010, the Air Force retired 335 A-7s, 248 F-111s, and 742 F-16s.

designed as a "persistent hunter-killer."[22] Like previously discussed attack aircraft, both MQ-1 and MQ-9 are day/night, precision-munitions-capable attack platforms. Unlike other aircraft discussed, they are remotely piloted aircraft (RPA), flown remotely from ground control stations. While not survivable in a contested environment, these UAVs provide a unique ability for extended dwell times of up to twenty-four hours to track and hunt targets.[23]

In 2010, the MQ-1 and MQ-9 combined to provide forty-five combat air patrols (CAPs) within the Afghanistan and Iraq areas of responsibility (AORs). Providing for data fusion enabling the flexibility the Air Force desires, they are capable of cross-cueing target or imagery data, as well as passing imagery to ground forces via the same enhanced data links found on fighter and other attack aircraft. The ISR and attack capabilities provided by MQ-1 and MQ-9 aircraft could have been beneficial during Desert Storm following the grounding of the Iraqi Air Force in the first week of the war. The Air Force could generate twenty-five full-time CAPs by utilizing fifty percent of the combat-coded MQ-1 and MQ-9 aircraft.

Finally, EC-130s continue to provide electronic attack and to support psychological operations. The Air Force retired the seven EC-130E aircraft used for command, control, and communications (C3), due to advances in the capabilities of its E-3A Sentry AWACS. While a detailed discussion of their capabilities is not possible for this paper, EC-130s today are more capable and survivable that those of 1990. In 2010, the Air Force inventory consisted of seven EC-130J Commando Solo II and fourteen EC-130H Compass Call aircraft. While this is two fewer total airframes than were available in 1990, there has been no

[22] Young, "2010 USAF Almanac," 133.

[23] Contested suggests that there is a persistent threat from enemy aircraft or ground base air defense networks.

reduction in the number of combat coded aircraft due to increased efficiency of newer variants.

Bombers

Since 1990, the Air Force bomber force has likely experience the greatest change in mission. The experience of Desert Storm changed the fundamental notion of what *strategic* meant for the Air Force. With the end of the Cold War, strategic was no longer simply a euphemism for nuclear. Success of conventional, non-nuclear bombing in precisely destroying Desert Storm targets from Phase I through Phase III provided incentive to expedite creation of a precision-capable conventional bombing force. The stealthy B-2 Spirit and conventional B-52H bombers provided dual capability for nuclear and non-nuclear missions, and the B-1B Lancer was converted to conventional mission only.

Desert Storm was the first large-scale test for Air Force stealth aircraft, a task the F-117 executed superbly. Though considered a fighter aircraft, the mission of the F-117 was essentially the same as the Spirit. Like the F-22A, the B-2 is a product of the Cold War, originally designed to penetrate Soviet air defenses with nuclear weapons. Like the F-117, the Air Force designed it to be conventionally capable from the outset. A total program cost of over $2 billion per aircraft, coupled with the end of the Cold War, led Congress to cut acquisition from an original intent of 132 airframes to 21, ultimately a fleet of 16 combat-coded aircraft.

Yet, even with the retirement of the 59 F-117 aircraft following Desert Storm, the Air Force can deliver with stealth more bombs on target. While the F-117 was capable of carrying only two weapons, the B-2 can carry up to 80 independently targeted precision-guided weapons.[24] A single B-2 can provide eight more weapons on target than could the entire combat-coded F-117 fleet of 1990. Further, with a range

[24] Young, "2010 USAF Almanac," 125-126.

of over 5,000 miles, nearly six times that of the F-117, the B-2 reduces the demand for tanker support, a significant consideration in Desert Storm.[25]

Likewise, the Air Force transition of the B-1B fleet to conventional precision munitions, and adoption of the B-52H added significant capability overall. In 1990, there were but thirty-three combat-coded B-52G bombers capable of conventional munitions in the Air Force inventory. Despite the reduction in the B-1B and B-52 bomber fleet overall, by 2010 there were thirty-six combat-coded B-1Bs and forty-four combat-coded B-52Hs, all capable of delivering precision munitions and integrated with the same advanced imagery and targeting pods discussed previously.[26] Use of precision munitions from B-52H aircraft in tank-plinking roles would free up F-15E aircraft for other missions, as well as reduce demand on tankers. In Desert Storm, one B-52H operating from bases outside the Kuwaiti Theater of Operations would have been able to destroy up to ten times as many targets as a single F-15E, without requiring a single air refueling.

Able to orbit at altitudes above significant surface-to-air threats while communicating with airborne and ground assets over enhanced data links the Air Force pursued for most of its tactical aircraft, these bombers can be integrated into an operational plan that allows them to strike either predetermined or pop-up targets. With the incorporation of night-vision goggles and on-board targeting pods, they can designate targets for their own weapons or for others. Further, enhanced electronic countermeasure suites allows them to operate in areas that would have previously been denied due to air defense threats, or that would have required escort from dedicated electronic warfare aircraft.

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[25] United States Air Force, "Fact Sheet: B-2 Spirit." http://www.af.mil/information/factsheets/factsheet.asp?fsID=82 (accessed 23 March 2012).
[26] Young, "2010 USAF Almanac," 125-126.

Mobility: Tankers & Transport

During Desert Shield and Desert Storm, 308 tankers and 481 military cargo aircraft combined to move 17 millions of ton-miles per day (MTM/D), an unprecedented feat.[27] Similarly to reductions in the tactical and bomber fleets, by 2010 the Air Force had reduced its combat-coded tanker aircraft by 29%, and its cargo aircraft by 25%. The KC-10 fleet was the least affected, retaining the same TAI, but the increased age of the fleet resulted in three fewer combat-coded aircraft. With the retirement of the KC-135A and -135E variants by 2010, TAI dropped to 417 aircraft and resulted in the loss of 174 combat-coded aircraft. First glance might suggest that a reduction of this magnitude might compromise mission readiness. But the Air Force no longer needed these tankers for three reasons: 1) the previously mentioned reduction of seventy-five B-1B and B-52 nuclear deterrence aircraft, part of the peace dividend resulting from the end of the Cold War, 2) the incorporation of advanced avionics pods onto tactical and bomber aircraft, which eliminated the need for escort aircraft, and 3) the increased range and capacity of the C-17 over the older C-141.

From a transport-aircraft perspective, the Air Force inventory of 2010 is significantly more capable due to the replacement of the C-141 with the C-17 and the reduced logistical requirement of a smaller tactical force. As previously mentioned, the buildup and execution of Desert Storm required nearly 17 MTM/D. This required 118 C-5 and 185 C-141 aircraft in 1990, nearly 91% of the Air Force's combat-coded strategic airlift capacity. In 2010, the same MTM/D would require 56 C-5s and 105 C-17s, only 61% of combat-coded capacity.[28] Further, the C-17 is

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[27] Air Force Pamphlet 10-1403, *Air Mobility Planning Factors*, 12 December 2011. Millions of ton-miles per day (MTM/D) is a formula-based metric used to calculate the amount of cargo tonnage transported across distance.

[28] Department of Defense, *Mobility Capabilities and Requirements Study 2016: Executive Summary* (2010), 4. http://www.airforce-magazine.com/SiteCollectionDocuments/TheDocumentFile/Mobility/MCRS-16_execsummary.pdf (accessed 24 March 2012).

capable of delivering outsize-cargo to forward operating bases utilizing either airdrop or theater-direct delivery with its ability to land on semi-prepared surfaces and short-landing fields.[29]

This capability to deliver cargo directly to the war fighter alleviated some reduction in tactical airlift capacity caused by the attrition of C-130 TAI since 1990. Between 1990 and 2010, the Air Force retired nearly 190 C-130E and added only 69 new C-130J aircraft, reducing the overall C-130 TAI by 32%.[30] The enhanced reliability of the C-130J partially offsets that reduction, resulting in a combat-coded airframe loss of only 25%. Additionally, the Air Force has tripled the size of its MC-130 fleet to 69 aircraft. The Air Force Special Operations Command C-130 variants deal nearly exclusively with airlift requirements of the Special Operations forces. As such, their significant increase helps serve to reduce demand for the conventional C-130 aircraft. Ultimately, this smaller C-130 force suffices due to the reduced logistical requirements of the smaller tactical force of 2010.

Intelligence, Surveillance & Reconnaissance

Intelligence, surveillance, and reconnaissance (ISR) is the only Air Force aircraft-mission-set that has seen an increase in total TAI from 1990 to 2010, discounting the retirement of the EC-135 aircraft whose mission DoD transferred to the US Navy. While tactical attack, bomber, and mobility aircraft have all experienced TAI and combat-coded reductions, ISR has grown in response to the insatiable demand for intelligence.

Since 1990, the Air Force inventory of E-3, RC-135, and U-2 airframes has remained stable. To those airframes, the Air Force added

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MCRS-16 determined Air Force strategic airlift capacity to be 35.9 MTM/D based on 2010 fleet sizes.

[29] AFPAM 10-1403 defines outsize-cargo as exceeding dimensions of 1,090" x 117" x 10", previously only capable of being carried on the C-5.

[30] United States Air Force, "Fact Sheet: C-130J." http://www.403wg.afrc.af.mil/library/factsheets/factsheet.asp?id=3444 (accessed 24 March 2012).

200 unmanned ISR aircraft with 25 RQ-4 airframes in addition to the aforementioned MQ-1s. Intended as a replacement for the U-2, the RQ-4 provides full-spectrum intelligence, providing combatant commanders with data that is critical for force protection, broad-area surveillance, and tactical targeting, among other uses.[31] While significant cost overruns have plagued the program, the Air Force employed the RQ-4 as a test-bed for new technologies that will shape the future ISR force. To its manned imagery aircraft, the Air Force has added 37 MC-12W aircraft to provide additional full-motion video capability to support ground personnel. Incorporating many of the same sensor systems found on the tactical aircraft pods, MC-12W aircraft can also cross-cue data for other weapon systems as well as provide laser target designator services for other airframes to execute kinetic strikes.[32]

Summary

In hindsight, Desert Storm emphasized the importance of stealth, precision munitions, and integrated electronic-warfare capabilities. These three considerations shaped Air Force investments in new capabilities during what was arguably the most financially constrained two decades the independent Air Force has yet experienced. The Cold War peace dividend resulted in a thirty percent reduction in manpower since 1990. Further, declining budgets in the early 1990s severely reduced existing Air Force acquisition programs, resulting in modification of existing aircraft through integrated solutions.

Today's Air Force is the most capable conventional airpower on the planet, yet still retains its strategic nuclear deterrent capability. It is also the smallest it has ever been. The question is not whether the Air Force of 2010 is capable of executing only another Desert Storm; there is more

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[31] Christopher Crew, "Costly Drone Is Poised to Replace U-2 Spy Plane," *New York Times*, 2 August 2011.

[32] United States Air Force, "Fact Sheet: MC-12." http://www.af.mil/information/factsheets/factsheet_print.asp?fsID=15202&page=1 (accessed 25 March 2012).

than enough combat capacity for such an operational plan. The question is whether the use of force required for another Desert Storm would leave enough force structure to execute the remainder of the 2010 QDR's *1-4-2-1* strategy: 1 - defend the homeland; 3 – deter conflicts with forward deployed forces in *three* other regions; and 1 - halt aggression in *one* of those regions outside the MCO.

Execution of the Desert Storm campaign plan in 2010 would have required fifty percent of the Air Force's 2,811 combat-coded aircraft. This is eleven percent more of the combat-coded force than was used in Desert Storm, despite requiring three hundred fewer aircraft. Of note, its impact across the functional areas of tactical fighter/attack, bomber, mobility, and ISR aircraft was not proportional.

Whereas 30% of the combat-coded tactical fighter/attack aircraft were required for Desert Storm, 51% of the 2010 force would be in play despite its being 127 aircraft smaller. This smaller force is largely the result of increased combat effectiveness due to precision munitions and stealth technology incorporated into F-22A and B-2 aircraft. Four B-2s would be sufficient to replace the forty-two F-117s required for Desert Storm. Further, B-1B and B-52Hs with advanced electronic warfare capabilities and employing precision munitions could complement B-2s for Phase I and II targets, as envisioned in the Desert Storm campaign, as well as Iraqi armor targets once Phase III commenced.

Use of precision-capable bombers in this manner would free fighter/attack and tanker assets for other missions. Figure 2 illustrates the effects that precision weapons and stealth technology have with respect to the required size of the strike package and air refueling support. Use of podded ISR and electronic warfare systems to reduce the requirement for RF-4 and EF-111 aircraft, and lessening the missions requiring SEAD escorts, would also reduce the overall tactical aircraft required.

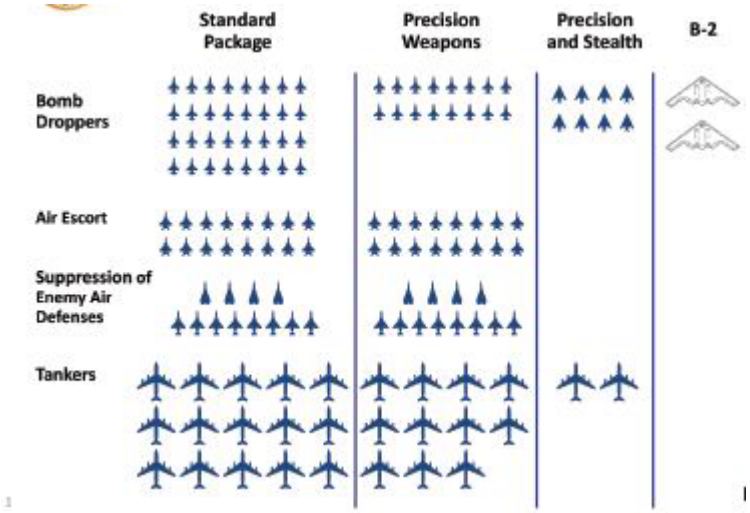

Figure 2: Value of Precision and Stealth

Source: Ruehrmund and Bowie, Arsenal of Airpower, Fig. 8, 11.

Within the mobility functional area, the reduced tactical force structure enables a much leaner, yet more capable mobility component. While tanker aircraft deployed remain at fifty-one percent of combat-coded capability, the number of tankers required is ninety-two aircraft less due to the reduced tanker support required of a leaner tactical force coupled with long-range bombers that do not require aerial refueling. The reduced logistical demand of this smaller, more precise force, coupled with the increased efficiency and effectiveness of the C-17 as compared to the C-141, allows deployment of only 317 transport aircraft. This thirty-four percent smaller transport force is only forty-seven percent of combat-coded capacity, significantly smaller than the fifty-nine percent deployed for Desert Storm. Remaining Air Force non-deployed combat-coded forces were better positioned in 2010 to respond to other conflicts due to these increased non-committed mobility resources.

Finally, the number of ISR assets required in 2010 was nearly twice those deployed in 1990. In truth, however, classification of the MQ-1 as an ISR asset due its primary use as an armed intelligence

platform accounts for this entire increase. As mentioned before, the speed of action and precision targeting requirements for the new American way of war levy significant requirements for accurate, actionable intelligence. As such, the capabilities demonstrated by the operational test E-8 aircraft in 1990 are now essential to American airpower. Further, persistent, full-motion video has enabled ground forces much greater battle-space awareness, upon which they now rely in many cases.

Comparing the force applied in 1990 to that which might have been required in 2010 is not a task taken lightly. Undoubtedly, the defensive capabilities of the Iraqis, or any other regime in question, would have changed over that period as well. Further, due to changes in where Air Force assets were located throughout the world, it is likely that movement of the required airpower to the Kuwaiti Theater of Operations would entail increased risk in other locations such as the Pacific. This was less of an issue in 1990 since the Air Force tasked most of the required force structure from the Continental United States and Europe, essentially then excess with the Soviet implosion only months prior. This was not an examination of operational plan change over the course of twenty years, but a question as to whether the force of 2010 was capable of executing Desert Storm due, given the decreased size of the operational force structure. This analysis leads to the conclusion that the Air Force invested wisely between 1990 and 2010 despite competing priorities in light of constrained fiscal resources.

Despite these assumptions and considerations, this thesis concludes that the Air Force of 2010 was capable of executing a Desert Storm scenario given the *1-4-2-1* guidance set forth in the 2010 QDR. Pursuit of stealth technologies and integrated electronic warfare upgrades to existing systems allowed the Air Force to increase its lethality and survivability in increasingly hostile environments. Precision weapons capability integrated into tactical fighter/attack and bomber

platforms changed Cold War-force planning requirements. Calculations shifted from the number of aircraft required per target to the number of targets an individual aircraft could destroy. Tanker and transport fleets were capably sized to support required tactical and bomber forces. ISR was, and will remain, a key enabler upon which a growing dependence rests. Looking forward to 2030, the Air Force must invest wisely again in the face of budget constraints or risk its ability to support the NMS.

Chapter 3

Air Force – 2030

Rising to the 21st century challenge is not a choice. It is our responsibility to bequeath a dominant Air Force to America's joint team that will follow us in service to the nation.

General T. Michael "Buzz" Moseley
18TH Chief of Staff of the U.S. Air Force

The historical experience of the past twenty years indicates that the ability of the Air Force to execute its mission as part of the National Security Strategy is not directly tied to the number of platforms it operates, but rather to the cumulative capability those platforms provide. Technology has enabled a single aircraft, as well as a single individual, to have a greater effect than was previously possible. The integration of stealth design and electronic warfare pods, coupled with precision munitions, allow a single aircraft to destroy multiple targets, a task that would have required numerous Cold War-attack aircraft in addition to the escort aircraft required to protect them from integrated air defense systems. Given that modern aircraft are more capable than their predecessors were, what might the Air Force of 2030 look like?

Contrary to conventional wisdom, the USAF of 2030 is likely to look similar to that of today, absent drastic changes to federal fiscal priorities, likely resultant only from an altered National Security Strategy in light of a changed strategic security environment. The majority of aircraft variants that the Air Force will use in 2030 are already sitting at Air Force bases today. The 2012 Air Force Posture Statement provides an excellent starting point to theorize what the Air Force of 2030 might look like. Coupled with recent Congressional testimony, lessons from

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Epigraph – General Michael T. Moseley, "The Nation's Guardians America's 21st Century Air Force: CSAF White Paper" (29 December 2007), 10.

recent aircraft procurement decisions, and an appraisal of the current federal fiscal environment, the 2012 Posture Statement should help predict the aircraft inventory the 2030 USAF is likely to maintain.

Strategic Security Environment & National Security Strategy

It is highly unlikely that the fundamental structure underlying the international environment will change dramatically within the next twenty years. The United States will continue to maintain and protect vital national interests in many area of the globe and serve as a global mediator and guarantor of the international order. Historical precedent portends a continuance of international competition and conflict, though the degree and frequency of significant armed conflict may continue to diminish due to the increased efficacy of other forms of national power as nations become more economically and institutionally intertwined.[2] There is, however, little to suggest that an end to armed conflict can be expected within the next twenty years.

If, then, interstate conflict continues to be a factor in the international political order, it is imperative that the United States' National Security Strategy (NSS) continue to prepare for just such a possibility. While the ability to pursue a *1-4-2-1* strategy as outlined in the 2010 NSS may likely remain the desideratum for force structure, pending federal budget cuts will force modification of this strategy. Failure of the political leadership to fund the force structure required by national strategy must result in either a change in strategy or a force that is unable to execute its mission. Until such change in strategy is articulated in policy documents and provided as guidance, the Air Force must continue to plan to fulfill existing NSS requirements and budget force structure to provide the following capabilities: 1 - defend *the* homeland; 4 – deter conflicts with forward deployed forces in *four* major

[2] Joseph S. Nye, Jr. *The Future of Power* (New York: PublicAffairs, 2011), 54-62.

regions; 2 - halt aggression in *two* regions simultaneously; and 1 - decisively defeat an adversary in *one* of those theaters.[3]

Manned Attack Aircraft

As articulated in the 2012 Air Force Posture Statement as well as in Congressional testimony by senior Air Force officers, the Air Force expects its 2030 aircraft inventory to include many of the same aircraft that are on the ramp today.[4] The most significant exception to this may come in attack aircraft, a realm in which the Air Force expects the F-35A Lightning II Joint Strike Fighter to begin entering operational service, where it will eventually replace fourth-generation A-10, F-16, and F-15E aircraft. [5] The Air Force, however, has delayed plans for the introduction of the F-35A, and has reduced the number of its total prospective inventory due to development and procurement delays reminiscent of those experienced with the F-22A Raptor. While the total number of F-35A aircraft present by 2030 is difficult to predict, current development status and anticipated rate of production allows some approximation. But any such estimate must include an appraisal of the future of the F-22A.

On 13 December 2011, the 187th and final Air Force F-22A Raptor rolled off the production line in Marietta, Georgia.[6] This brought to 139 the total number of combat-coded F-22A aircraft the Air Force will maintain for the next two decades and beyond. The F-22A is, and will

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[3] United States, Congressional Research Service, *Quadrennial Defense Review 2010: Overview and Implications for National Security Planning* (R41250, May 17, 2010), by Stephen Daggett, 22.

[4] Senate Committee on Armed Services, *Department of the Air Force: Fiscal Year 2013 Air Force Posture Statement*, 112th Cong., 2nd sess., 2012. http://www.posturestatement.af.mil/shared/media/document/AFD-120321-055.pdf (accessed 21 March 2012).

[5] Notionally the Air Force considers those tactical aircraft that have not incorporated stealth into the aircraft design as fourth-generation, whereas fifth-generation tactical aircraft are designed and built with stealth characteristics.

[6] Jonathan Serrie, "Last F-22 Raptor Rolls Off Assembly Line," *Fox News*, 13 December 2011. http://www.foxnews.com/us/2011/12/13/last-f-22-raptor-rolls-off-assembly-line/ (accessed 11 April 2012).

remain, the Air Force's air superiority fighter for the foreseeable future, with no replacement yet being contemplated. In order to ensure its ability to operate in contested environments, the Air Force will continue to upgrade the F-22A fleet.[7] The increment 3 series of upgrades will allow F-22As to carry the "Small Diameter Bomb" class of weapons, increasing its air-to-ground attack capability from two to eight simultaneous targets. Additional upgrades will allow employment of the latest air-to-air missiles, and may include integration of the Joint Helmet Mounted Cueing System (JHMCS) developed for the F-35A. This innovation provides an integrated helmet-mounted display of aircraft performance and targeting information while allowing pilots to target both air-to-air and air-to-ground weapons by using their eyes as a pointing device for target acquisition.[8] Though the F-22A provides an exceptional capability, the delay in F-35A acquisition requires the Air Force to continue to invest in technology upgrades for fourth-generation attack aircraft to enable seamless integration with the F-22A.

Over the next three years, the Air Force expects to finish the service-life extension program (SLEP) it has undertaken to re-wing its A-10 aircraft. This will allow 242 of these aircraft to continue flying into the post-2030 timeframe.[9] Increased reliability and reorganization of fleet structure will allow the Air Force to maintain 169 of these A-10Cs in combat-coded status, only five fewer than were combat-ready in 2010 despite the retirement of 92 aircraft during this time period. In FY11, the

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[7] Senate Armed Services Airland Subcommittee, *Department of the Air Force: Air Force Tactical Aircraft Programs,* 112th Cong., 1st sess., 2011, 7-8. http://armed-services.senate.gov/statemnt/2011/05%20May/Carlisle%2005-24-11.pdf (accessed 21 March 2012).

[8] "The F-22 Raptor: Programs and Events," *Defense Industry Daily*, 29 March 2012. Online at http://www.defenseindustrydaily.com/f22-raptor-procurement-events-updated-02908/ (accessed 11 April 2012).

[9] House Armed Services Tactical Air and Land Forces Subcommittee, *Department of the Air Force: Air Force Tactical Aviation Programs*, 112th Cong., 2nd sess., 2012, 5-6. http://www.airforce-magazine.com/SiteCollectionDocuments/Testimony/2012/March2012/032012holmes-posner.pdf (accessed 21 March 2012).

Air Force completed precision-targeting upgrades complemented by advanced data links, allowing these A-10C aircraft to employ GPS-guided munitions as well as to integrate seamlessly with other attack and ISR aircraft.[10] To increase pilot effectiveness and efficiency, the Air Force is pursuing technological improvements starting in FY12 such as the Helmet Mounted Cueing System (HMCS).[11] The A-10C is not the only legacy, fourth-generation attack aircraft whose service life the Air Force will seek to extend using SLEP modification, as it will also modify F-15 and F-16 aircraft to increase their useful service lives.

The Air Force had intended to replace the air superiority F-15 C/D and multi-role F-15E and F-16 aircraft with a combination of F-22A and F-35A aircraft. The necessity to meet NSS force planning requirements coupled with less-than-planned F-22A inventory and delayed F-35A operational readiness will require the Air Force to expend additional funds to keep these aircraft flying longer. Current Air Force planning calls for a SLEP for 175 F-15 C/D Eagles and 213 F-15E Strike Eagles to allow them to operate through the mid-2030s.[12] Additionally, the Air Force is pursuing the SLEP of 350 F-16 C/D aircraft, though it currently expects these aircraft to stop flying no later than 2025 due to airframe stresses. As the F-35A program matures, any future delays will require the Air Force to consider additional fighters for SLEP. Senior Air Force officers have some expectation that the Air Force will be required to modify the remaining 74 F-15 C/D currently in the inventory.[13] This brings the likely total in 2030 to 249 F-15 C/D air superiority fighters and 210 F-15E multi-role attack aircraft. When increased efficiency and reliability are considered, it is likely the Air Force will have a combined fleet of 321 combat-coded F-15s, 26 more than it currently possesses.

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[10] House Subcommittee, *Air Force Tactical Aviation,* 5-6.
[11] Senate Subcommittee, *Air Force Tactical Aircraft*, 4-5.
[12] House Subcommittee, *Air Force Tactical Aviation*, 7.
[13] House Subcommittee, *Air Force Tactical Aviation*, 7.

With the retirement of over 1,000 F-16s between now and 2030, the Air Force has seemingly staked its future combat capability on the development of the F-35A and the maturation of the next generation of unmanned aircraft systems (UAS).

The Air Force has pursued the F-35A as its sole, fifth-generation multi-role attack aircraft. Still in the developmental test-and-evaluation phase, the F-35A has experienced a significant number of technical challenges and cost overruns. Due to these challenges, the Air Force has delayed full-rate production for the F-35A, which delays the initial operating capability (IOC) of the aircraft. Despite initial plans for IOC to occur in March 2013, the latest estimates suggest that it will likely be no earlier than 2018. Further, in order to avoid pre-mature production of aircraft requiring extensive modification, the Air Force has slipped planned production of 98 F-35As from the 2013 timeframe until the end of the production run, expected to occur in 2035.[14]

The total number of planned Air Force F-35A was set at 1,763 after the 1997 QDR, down from the 1996 requirement of 2,043. Complicating Air Force procurement is the fact that the F-35A is part of the larger F-35 Joint Strike Fighter international family, of which the Air Force's F-35A model is only one of three variants. For its part, the Navy has already reduced its anticipated procurement from 1,089 to 680.[15] These reductions potentially increase the unit cost of each aircraft, adding one more variable for policy makers and procurement officials to consider. That said, recent test results raise the possibility that the program will turn the corner with Air Force full-rate production beginning by 2016 and IOC achievable by 2018. If that were the case, a production rate of 80 F-35A yearly would result in an inventory of 1,200 Air Force F-35A by

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[14] Senate Subcommittee, *Air Force Tactical Aircraft*, 9.

[15] United States, Congressional Research Service, *F-35 Joint Strike Fighter (JSF) Program* (RL30563, 16 February 2012), by Jeremiah Gertler. http://www.fas.org/sgp/crs/weapons/RL30563.pdf (accessed 11 April 2012).

2030. With a combat-coded ratio similar to the F-22A, this should result in 900 combat-coded F-35A aircraft.

Rounding out the manned attack aircraft are the C-130 variants, the AC-130 for kinetic attack and EC-130 for electronic attack and psychological operations. The Air Force expects both of these aircraft to remain viable through 2030 and continues to invest in upgrading to C-130J variants to provide increased reliability over current models. To replace eight ailing AC-130H aircraft, the Air Force will purchase 16 new AC-130J aircraft, increasing the fleet size from 25 to 33 AC-130s.[16] These new J-model gunships will have advanced avionics and weaponry that allow them to track multiple targets, as well as precision guided munitions in the form of small-bodied missiles to allow close-in targeting with limited collateral damage required for an urban, close-air-support environment.[17] Within the electronic spectrum, the USAF plans to add four additional EC-130Hs to its fourteen existing electronic attack platforms, and maintain its seven EC-130J psychological operations aircraft.[18] The USAF currently has no plans to replace the older H-model airframes, which it expects to fly through 2053.[19] These C-130 variants round out the manned attack aircraft the Air Force will operate in 2030, a force little changed outside of the retirement of the F-16 aircraft and operationalization of the F-35A.

Semi-Autonomous Attack Aircraft

The greatest unknown for the force of 2030 lies in the structure and capabilities of the unmanned aircraft systems (UAS). The Air Force

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[16] Michael Sirak and Marc Schanz, "Air Force World," *Air Force Magazine*, Apr 2010, Vol 93, No 4, 13.
[17] James Dunnigan, "Dirty Little Secrets: AC-130J Shifts to Missiles," *StrategyPage.com*, 3 May 2010. http://www.strategypage.com/dls/articles/AC-130J-Shifts-To-Missiles-5-3-2010.asp (accessed 23 April 2012).
[18] United States, General Accounting Office, *Airborne Electronic Attack: Achieving Mission Objectives Depends on Overcoming Acquisition Challenges* (GAO-12-175, March 2012), 17. http://gao.gov/assets/590/589765.pdf (accessed 23 April 2012).
[19] GAO, *Airborne Electronic Attack,* 13.

has articulated a plan to provide 65 MQ-9 combat air patrols (CAPs) by 2014, with the capability to surge to 85 CAPs when needed. If current planning metrics of four aircraft per CAP remain constant, that would translate into at least 260 combat-coded MQ-9s, not counting required training and maintenance spares. Beyond 2014, procurement of a follow-on attack unmanned aircraft (designated MQ-X by the Air Force) is yet undefined, though the Air Force's 2009 *Unmanned Aircraft Systems Flight Plan* provides some insight as to what may be expected.

The next significant hurdle that UASs must overcome lies in the concept of semi-autonomous operations. Currently, Air Force policy and crew operating instructions require multiple crews for each 24-hour CAP, with aircrews changing out after 12 hours of flight-duty.[20] While there are no aircrew members physically onboard the aircraft, the total number of aircrew members is not much changed from a manned platform. The Air Force does not expect crew-manning requirements to change until it can to overcome the policy and technology barriers to convert from multiple aircrews per UAS to multiple UASs per aircrew by the early 2020s. This next iteration will not allow autonomous UASs to engage targets kinetically, which the Air Force does not expect to be technologically feasible until the 2040 timeframe, but rather to operate semi-autonomously until a system monitor or the UAS itself reaches a decision point, whereupon it queries a human for instructions. [21]

In the long term, the Air Force recognizes the potential for a system of UASs to increase dramatically the capacity of a single human to act, reminiscent of the capability leap provided by precision munitions as demonstrated in Desert Storm. For a fifty-CAP requirement expected in 2009, the Air Force has projected that a semi-autonomous system could

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[20] Air Force Instruction 11-202 Vol 3, *General Flight Rules*, Air Combat Command Supplement, 9 March 2012, 101-102.

[21] United States Air Force, *Unmanned Aircraft Systems Flight Plan 2009-2047*, 18 May 2009, 50. http://www.govexec.com/pdfs/072309kp1.pdf (accessed 14 March 2012).

result in a reduction in pilots required from 570 to 250. The capacity to act autonomously, to include some level of autonomous engagement of specific targets in defined operating environments, would further reduce that pilot requirement to 150. [22] By the 2030 timeframe addressed in this thesis, the Air Force inventory of RPAs will not have advanced to the point of autonomy. Some level of semi-autonomous RPAs will be present, though it is likely the majority of them may be MQ-9 aircraft will new software and control interfaces.[23]

Manned and Optionally-Manned Bombers

Just as the Air Force expects the attack RPA force to undergo a transformation over the next few decades, the bomber force will likely experience changes similar to those in the attack realm over the past decade. Within the bomber force, the next twenty years will see the start of optionally-manned bombers with the introduction of the Long Range Strike-Bomber (LRS-B) aircraft. The Air Force expects the Long Range Strike portfolio to be a system of aircraft, the centerpiece of which is a nuclear-capable bomber platform that can operate either manned or unmanned.[24] The capabilities of the LRS-B have yet to be defined, though the Air Force has established a requirement for 80 to 100 of these bombers to begin replacing B-1B and B-52H aircraft in the mid-2020s. [25]

While the Air Force defines and develops the LRS-B, it expects all of its existing bomber variants to be present in the inventory of 2030 in reduced quantities as the new bombers begin to come on line. Upgrades

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[22] United States Air Force, *Unmanned Aircraft Systems Flight Plan 2009-2047*, Presentation Slides, Slide 11. http://www.defense.gov/dodcmsshare/briefingslide/339/090723-D-6570C-001.pdf (accessed 14 March 2012).

[23] Dave Majumdar, "USAF General: No Plans For MQ-X Program In Near Future," *DefenseNews.com*, 15 February 2012.

[24] Senate Committee, *FY13 Posture Statement*, 16.

[25] Department of Defense, *Aircraft Procurement Plan Fiscal Years (FY) 2012-2041*, March 2011, 21-22. http://www.airforce-magazine.com/SiteCollectionDocuments/Reports/2011/May%202011/Day25/AircraftProctPlan2012-2041_052511.pdf (accessed 23 January 2012); John Reed, "AFA: New bomber program 'underway'," DoD Buzz, 24 February 2012. http://www.dodbuzz.com/2012/02/24/afa-new-bomber-program-underway/ (accessed 25 March 2012).

will continue to ensure that the existing B-1B, B-52H, and B-2 aircraft are viable beyond 2030, and that they are capable of operating in concert with other USAF aircraft that have received updated weapon and data systems. While no inventory changes have yet been codified in the B-2 and B-52H fleets, the Air Force will retire six B-1Bs over the next few years, reducing the B-1B fleet to 59 aircraft with 33 combat-coded.[26]

Mobility

Iterative changes within the mobility portfolio will mildly influence the Air Force inventory of 2030. With the exception of the KC-46A tanker, which will begin to replace the Eisenhower-era KC-135s in 2017, today's Air Force is already operating the mobility aircraft of 2030 in support of Air Force missions around the world.[27] While acquisition of C-17A and conversion of older C-5s to C-5M variants has provided the Air Force airlift fleet with great improvements in reliability, the USAF tanker fleet has experienced increasing deterioration due to mismanagement and impropriety in the acquisition process that delayed replacement for the KC-135s by over a decade.[28]

The Air Force selection of the KC-46A as its KC-X airframe is the first of three phases to recapitalize its aging KC-135 tanker fleet.[29] With the last of 179 KC-46A aircraft planned for delivery in 2027, the Air Force tanker inventory of 2030 will likely consist of 59 KC-10s, 179 KC-46A, and 329 KC-135s. Notional KC-Y and KC-Z programs, expected to begin in the 2030 timeframe, will accomplish Air Force replacement of

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[26] Senate Committee, *FY13 Posture Statement*, 16.

[27] United States, General Accounting Office, *KC-46 Tanker Aircraft: Acquisition Plans Have Good Features but Contain Schedule Risk* (GAO-12-366, 26 March 2012), 5.

[28] DoD froze a 2001 Air Force attempt to lease a new tanker in 2003 when the Principal Deputy Undersecretary of the Air Force for Acquisition (Darleen Druyun) was found guilty of corruption and sentenced to jail. DoD cancelled a 2007 USAF program after the USGAO filed and sustained a protest to the contract. The 2010 attempt resulted in the contract being awarded to Boeing with first aircraft to be delivered in 2017.

[29] United States, General Accounting Office, *Defense Acquisitions: Assessments of Selected Weapon Programs* (GAO-12-400SP, March 2012), 103. http://www.gao.gov/assets/590/589695.pdf (accessed 5 April 2012).

the remaining 329 KC-135s.[30] The KC-46A provides essentially the same capacity for fuel and cargo as does the KC-135 it replaces, but will have enhanced flexibility of delivery, electronic integration with advanced data links, and improved defensive protection. An iterative improvement over the venerable KC-135, the KC-46A will provide increased efficiency and air-refueling capability well into the latter half of the twenty-first century, enabling the rapid global mobility the Air Force requires for its airlift and force-projection responsibilities.

In the airlift realm of mobility, the Air Force of 2030 will look remarkably similar to today's force. For strategic airlift, the Air Force will operate 52 C-5M and 223 C-17A aircraft.[31] After an Air Force study demonstrated that the C-5 airframe was viable well into the future, the Air Force pursued an avionics and engine upgrade that promises greater reliability and efficiency.[32] Combined with the C-17A, the C-5M will provide the backbone of the Air Force's strategic airlift past 2030.

As with strategic airlift, the Air Force tactical airlift inventory will look similar to today's force. The Air Force of 2030 will maintain a tactical airlift fleet of 318 C-130 aircraft, 134 of which are the more capable C-130J along with 184 older C-130H models.[33] An inventory of 50 CV-22 and 69 MC-130 aircraft will allow the Air Force to provide tactical airlift of Special Operations Forces. The Air Force CV-22 procurement program will finish in 2014, providing 34 airframes above 2010 levels. Further, while the total number of MC-130 aircraft remains constant at 69 airframes, 37 of these will be MC-130J aircraft that the Air Force procured on a one-for-one replacement basis for older MC-

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[30] United States, General Accounting Office, *KC-46 Tanker Aircraft: Acquisition Plans Have Good Features but Contain Schedule Risk*, Accessible Text (GAO-12-366, 26 March 2012). http://www.gao.gov/assets/590/589599.txt (accessed 24 April 2012).

[31] General Norman Schwartz, "Sustaining Readiness with Constrained Budgets" (speech, Air Force Association Air War Symposium, Orlando, FL, 23 February 2012).

[32] United States Air Force, "Fact Sheet: C-5." http://www.af.mil/information/factsheets/factsheet_print.asp?fsID=84&page=1 (accessed 21 March 2012).

[33] Senate Committee, *FY13 Posture Statement*, 7.

130E/H variants.[34] Finally, though Afghanistan's permissive air domain has allowed experimentation with tactical airlift via remotely piloted helicopters, divestiture of 38 C-27J aircraft suggests the Air Force is not interested in this mission at this time. [35] Pending budget cuts make it increasingly unlikely that the Air Force will seek to pursue a new endeavor into small-aircraft tactical airlift. Further, this lack of investment over the current Future Year Defense Plan (FYDP) increases the likelihood that the Air Force tactical airlift aircraft will be manned for the foreseeable future. While it is likely that remotely piloted aircraft will be utilized for tactical airlift in the 2030 timeframe, the Air Force is currently not likely to be the service operating them.

Intelligence, Surveillance, and Reconnaissance

Intelligence, surveillance, and reconnaissance (ISR) will likely see the greatest change in the 2030 timeframe, though it is all but impossible to predict what that force may look like. In the aftermath of Desert Storm, it would have been nearly impossible to find a reputable source who would have predicted the impact that RPAs would have on future ISR. The current Air Force plan suggests that much of what is now in use will still be flying in 2030, with the exception of its 174 MQ-1s, whose program is to terminate by 2023.[36] The Air Force had planned for the RQ-4 high-altitude ISR RPA to replace its U-2 aircraft, but the Block 30 variant of the RQ-4 has proven more expensive and less capable than the U-2 it was to replace. As a result, the Air Force will divest the 18 Block 30 RQ-4s intended to replace the U-2. It will continue to operate its U-2 fleet through 2040, simultaneously utilizing its 37 Block

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[34] Senate Committee, *FY13 Posture Statement*, 23.

[35] General Norman Schwartz, "Air Force Priorities for a New Defense Strategy" (speech, Center for Strategic and International Studies, Washington, DC, 9 February 2012); W.J. Hennigan, "Military uses drone helicopter on supply mission for first time," *LATimes.com*, 9 January 2012. http://www.latimes.com/business/money/la-fi-mo-cargo-drone-lockheed-20120109,0,5633873.story (accessed 10 January 2012).

[36] House Subcommittee, *Air Force Tactical Aviation*, 23.

20 and Block 40 RQ-4s to provide warfighter support while pursuing future capability.[37]

With respect to manned ISR platforms, little change is currently expected. In addition to the revitalization of the U-2 program for reasons mentioned above, the Air Force will continue to operate its RC-135, E-3, E-8, and MC-12W programs. Current Air Force planning anticipates that only the MC-12W program will undergo any appreciable change from 2010 force structure, adding five additional aircraft and transferring operation of the aircraft to the Air National Guard.[38]

Summary

Over the past twenty years, the Air Force has leveraged technology to allow it to do more with less. It is likely that the Air Force of 2030 will be marginally smaller than the force of today, as technology will enable fewer platforms to deliver more capability. By and large, the operational Air Force of 2030 will likely look very similar to the force structure present today.

The first reason for this similarity lies in the nature of the international environment. The United States has been, and will continue to be, the global mediator and guarantor for the general welfare of the international order. While the degree and frequency with which nations engage in significant armed conflict may continue to diminish due to the increased efficacy of other forms of national power, the Air Force must continue to plan to provide capabilities congruent with the 2010 NSS *1-4-2-1* approach until directed otherwise.[39]

The second reason for the similarity in force structure stems from the Air Force desire to pursue multi-role aircraft. The 2012 Air Force Posture Statement and recent Congressional testimony by senior Air

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[37] Senate Committee, *FY13 Posture Statement*, 7; USGAO, *Defense Acquisitions*, 77-78.
[38] Senate Committee, *FY13 Posture Statement,* 7.
[39] United States, Congressional Research Service, *Quadrennial Defense Review 2010: Overview and Implications for National Security Planning* (R41250, May 17, 2010), by Stephen Daggett, 22.

Force officers indicates that the Air Force expects its 2030 aircraft inventory to include many of the same aircraft that are on the ramp today. The Air Force has established a baseline requirement for 2,000 attack aircraft to meet the NSS planning directive, of which the A-10C, F-15C/D/E, and F-22A total 888 attack aircraft.[40] The USAF expects the F-35A to make up the difference.

Based on F-35A production delays discussed above, the Air Force is currently positioned to defer this requirement in the near term, though it can expect an inventory of 1,200 F-35A by 2030.[41] Any further delay in the F-35A production schedule, or complications leading to less-than-anticipated SLEP of A-10, F-15, or F-16 aircraft, could result in significant shortfalls in Air Force attack aircraft capability. The Air Force has essentially bet its future combat effectiveness on the F-35A, while trying to mitigate some risk in the short term by pursuing SLEPs for its fourth-generation aircraft. Additionally, it will upgrade avionics and weapons capability to ensure these attack aircraft can integrate seamlessly in the battle space in a networked environment.

While bolstering the electronic-warfare capabilities of its attack aircraft, the Air Force will continue to upgrade its kinetic and electronic attack C-130 variants in light of their proven performance supporting Special Operations and conventional ground forces. The Air Force will increase the AC-130 fleet size by 33% with new, more-capable AC-130J aircraft. It will maintain its EC-130 aircraft at present aircraft inventory.

The greatest unknown for the force of 2030 lies in the structure and capabilities of its UASs. The Air Force plans to retire all RQ-4 Block 30s immediately and all MQ-1s by 2023. While it recognizes the need for a follow-on MQ-X, the Air Force has no acquisition plans in train at this

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[40] United States, General Accounting Office, *Tactical Aircraft: DOD's Ability to Meet Future Requirements Is Uncertain, with Key Analyses Needed to Inform Upcoming Investment Decisions* (GAO-10-789, 29 July 2010), 5. http://www.gao.gov/assets/310/308236.pdf (accessed 23 Jan 2012).

[41] GAO, *Tactical Aircraft*, 9-12.

time due to the current fiscal restrictions. The force of 2030 will likely operate a MQ-9 derivative with many fewer pilots due to semi-autonomous control mechanisms.

Bombers, likewise, will be similarly postured with B-52H, B-1B, and B-2 aircraft still in service, though in slightly reduced numbers. The Air Force will pursue LRS-B to replace less reliable B-52H airframes and B-1Bs that are approaching the end of their service life. LRS-B will also mark the beginning of remotely piloted long-range bomber aircraft, though the optionally-manned requirement will likely result in little overall effect on manning requirements.

The acquisition of the KC-46A and iterative upgrades to the C-5M will greatly increase the capability of the mobility forces, providing significant improvements in efficiency and cost effectiveness. At question is whether the primary strategic airlift force of 52 C-5M and 223 C-17A aircraft is sufficient to meet the airlift demands of the highly mobile, global force required by the NSS, as will be discussed in the next chapter. Tactical airlift will be provided by 318 C-130 aircraft, while Special Operations support will be increased as the CV-22 inventory reaches full strength at 50 airframes and the MC-130 force is recapitalized with 37 new MC-130J aircraft. While other services have begun to experiment with unmanned tactical airlift platforms, the Air Force is unlikely to invest significantly in this capability through 2030.

Intelligence, surveillance, and reconnaissance (ISR) will likely see the greatest change in the 2030 timeframe, though it is all but impossible to predict exactly what those changes will be. As mentioned, the Air Force will terminate its MQ-1 program by 2023, while retaining the MC-12W, though the Air National Guard will assume MC-12W operations. For capability and economic reasons, the Air Force will continue to operate its U-2 fleet through 2040 with the expectation that the future capabilities of the RQ-4 Block 40 fleet will eventually provide the increase in efficiency and capability the Air Force desires.

The Air Force of 2030 will maintain approximately 4,936 aircraft, 295 aircraft fewer than its 2010 inventory for a reduction of less than six percent. Importantly, this inventory relies on the acquisition of three wholly new aircraft: 1,200 F-35A, 179 KC-46A, and 100 LRS-B. In terms of aircraft, it will be the smallest Air Force the United States has ever maintained. Likewise, while it has not been much discussed due to difficulties with projecting manning levels, the personnel force structure will likely be at its smallest ever. As has been seen in the discussion of 2010 force structure, size does not equal capability, though there is some truth to the adage that quantity has a quality all its own. While the capability of an individual aircraft and Airman to create effects has increased significantly over the past two decades, this thesis seeks to examine the overall capability of the Air Force in light of its strategic role in national defense. Thus, the next chapter will seek to examine the implications of Air Force 2030, based both to its size and its ability to execute the missions it is assigned.

Chapter 4

Considerations for the Future

As a nation we were not prepared for World War II. Yes, we won the war, but at a terrific cost in lives, human suffering, and material, and at times the margin was narrow. History alone can reveal how many turning points there were, how many times we were near losing, and how our enemies' mistakes pulled us through. In the flush of victory, some like to forget these unpalatable truths.

General Henry "Hap" Arnold
General of the Air Force

If future execution of current Air Force acquisition programs matches today's expectations, then the Air Force of 2030 will look much the same as the force of 2010. While the overall structure of the international environment is unlikely to change during the next twenty years, however, the technological abilities and capabilities of other nations will not remain stagnant. Ultimately, the use of force will remain the final arbiter when one nation opposes the actions or desires of another. What then, are the implications of the expected force structure of the Air Force in 2030? What changes in the Air Force's operating environment may be expected by 2030, and how might those changes affect the Air Force's ability to project force and provide the United States with strategic options?

As was discussed in previous chapters, conventional wisdom on Desert Storm has suggested that only 39% percent of the overall force structure was required, with barely 30% of the tactical aircraft employed. When viewed, however, in light of the force required to execute the *new*

Epigraph – General Henry H. "Hap" Arnold, "Third Report of the Commanding General of the Army Air Forces (Air Power and the Future)," *The War Reports* (Philadelphia, Pa.: J. B. Lippincott Company, 1945), quoted in Herman S. Wolk, *Planning and Organizing the Postwar Air Force: 1943-1947* (Washington: Office of Air Force History, U.S. Air Force, 1984), 39.

American way of war that the American public and policy makers now view as the norm, the Air Force committed 84% of electronic attack aircraft, 73% of its precision-weapons-capable aircraft, 91% of the conventional weapons capable bombers, 91% of the strategic airlift aircraft, and second stage activation of the Civil Reserve Air Fleet. Conventional wisdom as to the effective utilization rates of Air Force aircraft in Desert Storm is improperly skewed by the inclusion of the Cold War aircraft which had yet to be officially retired. When viewed through the lens of what is now accepted as the standard for American warfare, Desert Storm required a much greater percentage of force than may have previously been suggested.

Air Force adoption of network-based information technologies combined with normalization of electronic warfare and precision-weapons capability across the tactical aircraft fleet, and adoption of stealth technology in fifth-generation aircraft has allowed the Air Force to operate with relative impunity over the past twenty years to provide overwhelming combat airpower, and all but eliminate the possibility of aerial attack against friendly ground forces. Despite a 26% reduction in aircraft force structure, the Air Force of 2010 was capable of executing an equivalent of Desert Storm, while utilizing 300 fewer aircraft than required in 1990, due to the increased capability provided by network-based information technologies and precision weapons. Air Force domination of the air domain has enabled a freedom of maneuver for American ground forces that has been unopposed by enemy aircraft since 15 April 1953, a record the Air Force has little intention of seeing tarnished.[2]

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[2] Peter Grier, "April 15, 1953," *Air Force Magazine* 94, no. 6 (June 2011): 54-57. Grier chronicles the last known time when any American ground troops were killed by an enemy aircraft. On that date, a North Korean "bed check Charlie" aircraft killed two American troops on the island of Cho-do off the North Korean coast when it bombed a radar facility.

Despite being slightly smaller than today's force, the Air Force of 2030, as described in Chapter 3, will be sufficiently postured to provide policy makers with strategic options and ensure the United States' *continuing advantage*.[3] It will continue to proactively leverage those technologies and systems that enable its future successes. The Air Force's strategic plan for the next twenty years has sought to build a force structure that is capable of meeting those threats it expects to face. The planned Air Force of 2030 will be capable of providing the combat forces required by a *1-4-2-1* National Security Strategy based on its analysis of the likely operational environment. Importantly, it believes that the future environment will be characterized by a technological leveling amongst the actors involved resulting in loss of fourth-generation aircraft viability, which will lead to a marginal loss of deterrence with respect to low-level conflicts.

Environmental Assessment

Andrew Krepinevich, a veteran of the Department of Defense's Office of Net Assessment under Andrew Marshall, and others have predicted that the likely future will witness a resurgence in defensive anti-access/area-denial (A2AD) capabilities that may threaten our ability to project force.[4] While the structure of the international environment is not expected to change, increased defensive capabilities of its disparate actors may motivate their increased use of force to secure national political ends, thus resulting in requirements for increased Air Force capabilities to meet evolving threats. Due to the proliferation of advanced technologies, as has been articulated by David Shlapak, the major contingency operation the Air Force faces in the near future is

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[3] Everett C. Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (New York: Frank Cass, 2005), 6. Dolman uses the term "continuing advantage" to suggest that the point of strategy is not the culmination of events between states, but rather to "influence states' discourse in such a way that it will go forward on favorable terms."

[4] Andrew Krepinevich, Barry Watts, and Robert Work, *Meeting the Anti-Access and Area-Denial Challenge* (Washington, DC: CSBA, 2003), 11-15.

likely "not your father's MCO."[5] These advanced technologies will also constrain the freedom of movement for Air Force aircraft along the spectrum of conflict. A 2010 Air Force *Strategic Environmental Assessment* of 2010-2030 lists five developments for consideration, though two are particularly germane to this discussion: 1) potential adversaries are acquiring or developing the means to challenge the US military resulting in a technological leveling, and 2) effective deterrence is expected to become more challenging for the United States.[6]

Technological Leveling

Since Desert Storm, the Air Force has utilized podded electronic warfare systems to maintain an edge over air defense systems and ensure the survivability of its aircraft. Senior Air Force leaders believe that technological advances in air defense systems will render these podded systems ineffectual against evolved defenses within the next decade.[7] Likewise, while the Air Force has used network-based information technologies to increase the effectiveness of its aircraft, adversaries have developed the ability to degrade many of these data links, thus beginning to level the playing field. As an example, though the purpose of this thesis is not to begin planning for conflict against China or any other specific country, a 2007 RAND report articulates a change in Chinese planning methodology to fight "local wars under high-technology conditions" following the Coalition victory over the Soviet-and Chinese-weapon equipped Iraqi military in Operation Desert Storm, disavowing Mao's doctrine of the "People's War." This abrupt change was instituted in 1993 by Chinese President Jiang Zemin, and may help

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[5] David Shlapak, *Shaping the Future Air Force* (Santa Monica, CA: RAND, 2006), 3.
[6] United States Air Force, *Strategic Planning 2010-2030: Strategic Environmental Assessment*, Prepared by the Directorate of Strategic Planning, 2011, 11-19.
[7] John A. Tirpak, "The F-35 or Bust," *AirForce-Magazine.com* (27 April 2012). http://www.airforce-magazine.com/DRArchive/Pages/default.aspx (accessed 27 April 2012).

explain the Chinese technological buildup witnessed over the last twenty years.[8]

Proliferation of latest-generation technology, ranging from integrated air defense systems to cyberspace capabilities, may reintroduce much of the fog and friction that Air Force technological advances have sought to eliminate. The high-speed, networked warfare the United States has embraced requires an ability to gain and maintain air superiority to provide freedom of movement for air and ground forces alike. Advances in adversary's integrated air defense systems over the coming decade will challenge the survivability and effectiveness of fourth-generation tactical aircraft to operate in these anti-access/area-denial environments. Just as the Air Force has worked to increase its ability to wage electronic warfare to degrade and disrupt air defenses, so too are other nations, and non-state actors, pursuing the ability to degrade and disrupt the data links that enable our networked way of war.

Future Air Force operations in these environments will incur increased risk due to fiscal restraints and program delays in F-22A and F-35A acquisition programs. To meet the 2,000 tactical aircraft baseline addressed in Chapter 3, the Air Force has been required to extend the service life of fourth-generation fighter aircraft as a stopgap to alleviate a fighter shortfall. Without sufficient fifth-generation aircraft to provide coverage, remaining fourth-generation A-10, F-15, and F-16 aircraft will be at risk by 2018, says Air Combat Command chief General Mike Hostage.[9] By 2030, the remaining A-10 and F-15 aircraft will be at even greater disadvantage. If the current requirement of 2,000 tactical aircraft is still required to execute the 2030 National Security Strategy, the operational readiness of at least 1,200 F-35A by 2030 is an Air Force

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[8] Roger Cliff, Mark Burles, Michael Chase, Derek Eaton, and Kevin Pollpeter. *Entering the Dragon's Lair: Chinese Antiaccess Strategies and Their Implications for the United States* (Santa Monica, CA: RAND, 2007), 21.

[9] John A. Tirpak, "The F-35 or Bust," *AirForce-Magazine.com* (27 April 2012). http://www.airforce-magazine.com/DRArchive/Pages/default.aspx (accessed 27 April 2012).

imperative. Without these fifth-generation aircraft to disrupt and degrade the A2AD threat, the Air Force fourth-generation fleet will be unable to survive the "murderous environment of anti-access, aerial-denial systems no matter how tricked-out with upgrades they are," says General Hostage.[10]

Deterrence in a Complex World

Considering the deterrence issue raised for consideration, the increase in the number of potential actors further complicates the United States ability to deter any one actor. A fundamental part of the *1-4-2-1* strategy is the ability to deter conflicts with forward deployed forces in four major regions. The United States has long utilized a *strategic deterrence* capability, read in almost all cases nuclear, to protect the homeland against attack. It was, perhaps, an unstated assumption that these forces would be capable of holding at risk any other nation that desired to do us harm. For many, 11 September 2001 changed that assumption. While deterrence of some actors may be possible with our nuclear inventory, political reticence to employ such weapons requires an increased role for a robust conventional force to provide rapid and proportional response anywhere in the world. Fifth-generation tactical attack aircraft alone, while capable of operating in nearly any threat environment, are likely incapable of providing the non-nuclear proportional response required to act as a deterrent.

The bomber, recapitalization of which is the second imperative for the Air Force of 2030, fulfills this role. As was mentioned, the threat of 2030 will not allow the current bomber fleet to operate in A2AD environments without escort from fifth-generation tactical attack aircraft. This is a significant limitation on the nation's ability to respond rapidly and proportionally to an attack, and thus negatively influences that deterrent ability of the Air Force's conventional forces. Acquisition of the

[10] Tirpak, "F-35 or Bust."

Long Range Strike-Bomber (LRS-B) is required to alleviate this shortfall. Failure to do so will not mean the Air Force is unable to respond in defense of the nation, but rather that such response will incur greater risk for the escort aircraft and tanker support required to ensure successful accomplishment of the mission. Further, in addition to incurring additional risk during the operation, such enabling support also decreases the Air Force ability to respond to any other contingency, creating an unplanned tax on system resources.

Imperative of Strategic Mobility

Another factor of the 2030 strategic environment will be the increased distances across which the Air Force will likely have to operate as it consolidates its force structure for reasons of operating efficiency. The Pacific pivot articulated by Secretary of Defense Panetta in 2012 creates a greater requirement for mobility due to limited basing options and the vast distances involved in the response to any threat.[11] The Air Force's ability to operate globally, and the distances involved in the Pacific, is predicated on the ability to refuel in flight. The Air Force of 2030 will continue to rely on the rapid global mobility of its operational forces, driving an imperative to recapitalize the tanker fleet, beginning with the KC-135 aircraft. The average age of the Air Force's 417 KC-135s is now nearly 51 years old, with the last new KC-135 being delivered in 1964.[12]

The last twenty years of continuous combat operations, from Desert Shield through Southern Watch to Enduring Freedom, have taken a serious toll on the KC-135 fleet. At this point, Air Force maintainers have begun fabricating replacement parts by hand, since the aircraft are so old that many parts are no longer manufactured and existing supplies

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[11] Department of Defense, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington, DC: Government Printing Office, 2012), 2.

[12] United States, General Accounting Office, *KC-46 Tanker Aircraft: Acquisition Plans Have Good Features but Contain Schedule Risk* (GAO-12-366, 26 March 2012), 2.

have long since been used up.[13] In order to support the rapid flexibility and mobility that characterizes the American way of war, the Air Force must maintain a robust tanker fleet. Failure to efficiently execute the KC-46A program may delay KC-Y and KY-Z programs, thus jeopardizing the Air Force's ability to provide future power projection options. This is not to suggest that any research indicated such a proposal to cut the KC-46A program existed, but rather reemphasize that failure to actively manage this recapitalization would be extremely detrimental long-term. Yet, the risks for future Air Force operational effectiveness are complicated not only by potential changes to the operational environment, but also to the increasing age of the fleet exacerbated by the delay of numerous acquisition programs.

Tyranny of Age

As was just discussed with respect to its tanker aircraft, recapitalization of aging inventory is an issue the Air Force must address within the coming years. If the Air Force is unable to recapitalize its fourth-generation tactical fleet, not only will the remaining fourth-generation aircraft be at a technological disadvantage that may prove insurmountable, but limitations due to the age of respective airframes will undoubtedly begin to erode operational effectiveness. Currently, the youngest variant in the fourth-generation inventory is the F-15E with an average age in 2010 of 18 years.[14] If the Air Force of 2030 retains only the youngest 210 F-15Es in its inventory, the average age of those aircraft will be 40 years.[15] This age consideration is more significant within A-10 and F-15C/D fleets as current average ages are 30 and 28

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[13] Geoff Ziezulewicz, "Taxed by wars, aging tankers suffer fleet fatigue," *Stars and Stripes* (18 October 2010). http://www.stripes.com/news/taxed-by-wars-aging-air-tankers-suffer-fleet-fatigue-1.122207 (accessed 30 April 2012).

[14] United States, General Accounting Office, *Tactical Aircraft: DOD's Ability to Meet Future Requirements Is Uncertain, with Key Analyses Needed to Inform Upcoming Investment Decisions* (GAO-10-789, 29 July 2010), 4. http://www.gao.gov/assets/310/308236.pdf (accessed 23 Jan 2012).

[15] Authors calculations based on F-15E tail numbers obtained from http://www.f-15e.info/joomla/serial-numbers (accessed 24 April 2012).

years respectively. [16] Ultimately, the increasing fleet age provides another component of increasing risk the Air Force must manage, along with the potential reduction in excess capacity as viewed in light of an increased operational environment complexity.

Diminished Excess Capacity = Increased Risk

The notional 2010 Desert Storm major contingency operation required roughly 50% of the total Air Force inventory. Estimation of that force requirement, however, is based on the expectations and capabilities of an Iraqi air defense network and air force. Due to the technological leveling discussed previously, the major contingency operation of 2030 will likely encounter a vastly superior air defense network.[17] Further, Desert Storm occurred in an international environment still influenced by the bi-polar Cold War shadow. Few other regional actors could or would challenge the United States. The environment of 2030 is not likely to be as forgiving. Potential increased complexity in the international environment coupled with the proliferation of A2AD capabilities may lead to the loss of some deterrence value.

As stated previously, the conclusion of this thesis is that the Air Force of 2030 will be able to meet the expected threats. Of question is how much excess capacity is built into those expectations to meet the unforeseen scenarios or advances in adversarial technology, Nassim Taleb's proverbial *Black Swan.*[18] Though by definition the Black Swan is unpredictable, the potential ways to mitigate the effects of just such an occurrence include organizational resilience and excess capacity. Such a mitigation strategy may call into question the efficacy of attempting to

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[16] GAO, *Tactical Aircraft, 4.*

[17] Krepinevich et al, *Anti-Access and Area-Denial,* 93-95. Krepinevich lists China, Iran, and North Korea as nations that are pursuing advance air defense systems. Other countries currently operating advanced Russian manufactured surface-to-air systems include: Algeria, Armenia, Azerbaijan, Belarus, Bulgaria, Cypress, Greece, Kazakhstan, Slovakia, Syria, Russia, Turkey, Ukraine, Venezuela, and Vietnam.

[18] Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House, 2007). Taleb coins the term "Black Swan" to refer to those events that are outliers that carry extreme impact which we try to explain post mortem.

plan a future force structure only marginally capable of providing excess capacity beyond that which is expected to be required. The less excess capacity available, the greater the risk that existing capacity can be overwhelmed. While that might be acceptable risk in a commercial venture if the inventory required can be rapidly acquired by a quick trip to one's local big-box store, the tools of national defense are not so easily produced. In attempting to size the structure of the force for 2030, there is a tradeoff between efficiency, to include the size of the force, and risk.

Due to projected changes to the operational environment, it is possible that the threats of 2030 will not allow the massing of such a high percentage of American airpower without incurring increased risk in another part of the world. If the force structure required prosecuting a major contingency operation in 2030 is so great a percentage of the overall force structure that it discourages military application of force in the first place, what affect will that have on what the United States is willing to consider a strategic interest? While it may be a rhetorical question to some degree, to what extent should the Air Force's capability for force projection affect the National Security Strategy? Parochially, what does all this mean for the Air Force, and is the Air Force culture itself at risk?

Cultural Implications

There is some trepidation within the Air Force for what the next twenty years might mean. Initially, the attempt to understand and address these concerns was to be a significant portion of this thesis. Overwhelmingly, the research for this thesis suggests that many of these concerns are the product of hyperbole about what that future might be. This is not to say that policy makers and Airmen at all levels will not have to make difficult choices, rather, that those choice are still choices and have not been relegated to some type of technological determinism. For a service that prides itself on innovation and technology, this journey will likely have some impact on Air Force culture as unmanned systems

begin to change the character of war from the Airman's perspective. As national policy and Air Force adoption of technology move towards autonomous flight of unmanned systems, the number of aircrew members required to operate the military aircraft will diminish. While this change would likely have significant impact on an Air Force culture that still very much lionizes its operators, this revolution will have only just begun within the period this thesis considered.

This is not an attempt to brush aside further concerns, but, rather, recognition that the future is what we make of it. The past decade has seen the Air Force adopt new missions and establish core competencies that have little to do with the employment of *air* power, as defined as the controlled traversal of physical objects through the air medium. The Air Force has redefined air power to be airpower, inclusive of air, space, and cyberspace, and suggested that the Air Force corporate identity is defined by innovation vice the aircraft. Success of such an attempt to rebrand itself is only likely to succeed with strong organizational leadership where one narrative is heard loudly above those who advocate a less disparate definition.

Summary

The planned Air Force of 2030 will be capable of providing the combat forces required by a 1-*4-2-1* National Security Strategy based on its analysis of the likely operational environment, however, the future is difficult to predict. What can be known is that as of today, the Air Force has wagered its ability to defeat the expected threat of 2030 on the F-35A, LRS-B and KC-46A acquisition programs. The Air Force's strategic environmental analysis leads it to believe that the next two decades will be characterized by a leveling of the freedom of movement experienced over the last two decades. Proliferation of advanced technologies has enabled air defense systems to advance to such a degree as to render further iterative enhancements to podded fourth-generation aircraft no longer viable. While the pendulum has begun to swing back towards air

defense systems, the Air Force strategic plan seeks to mitigate the threat through significant investment in fifth-generation capabilities. Wise investment in iterative upgrades allowed fourth-generation aircraft to excel at their missions. The continuing advantage the Air Force has enjoyed for the past few decades does not come easily, nor cheaply, and sets the basis for its acquisition programs with respect to the F-35A, LRS-B, and KC-46A.

CONCLUSIONS

In the sixty-five years since its inception, the United States Air Force has transformed itself into the most technologically advanced fighting force the world has ever seen. The Air Force has pursued technology not only to maintain a continuing advantage, but also to ameliorate the Airmen's challenge in overcoming Clausewitzian fog and friction. For the Air Force, Desert Storm marks the start of this epoch, this *revolution in military affairs*. Adoption of new technology has allowed the Air Force to vastly increase the "speed, maneuver, flexibility, and surprise" of its operations, whether in a supportive or principal role.[1] Technology has allowed the Air Force to do more with less, facilitating a significant reduction in the number of aircraft required to *fly, fight, and win* the nation's wars. Stealth, precision weapons, and network-based information technologies have enabled Boot's *new American way of war,* suggesting the possibility of a "quick victory with minimal casualties on both sides."[2]

The success of the United States' strategy in Desert Storm resulted in an accelerated reorganization of forces away from traditional attrition-warfare conceptualizations of major combat.[3] The lack of a peer competitor against which to balance our forces and the lessons of the first Gulf War helped shape Air Force decisions as to what aircraft were necessary for an effective fighting force, exerting great influence on today's rated force structure. Perhaps unsurprisingly, this force structure is significantly smaller than that which was postured against

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[1] Max Boot, "The New American Way of War," *Foreign Affairs* 82, no. 4 (July/August 2003): 42.

[2] Max Boot, "New American," 41-58.

[3] Boot, "New American," 41. Boot references Russell Weigley's 1973 book "The American Way of War" that popularizes the notion that previous U.S. major conflicts (U.S. Civil War, both World Wars, and, by and large, Korean War and Vietnam Conflict) were wars of production, and won "not by tactical or strategic brilliance but by the sheer weight of numbers."

the looming Soviet threat. Yet, the reduction in aircraft is not solely the result of technological displacement.[4]

Conventional wisdom has suggested that this reduction in force structure has been at the detriment of the Air Force's ability to perform its mission. This thesis challenges conventional wisdom that Desert Storm required only 30% of the combat Air Force. It has shown that the force of 2010, despite significant reductions in size as compared with Desert Storm, was sufficiently sized to provide the capability required to execute the guiding National Security Strategy. Finally, it concludes that the planned force is sufficient to meet the challenges and responsibilities of a *1-4-2-1* National Security Strategy in 2030, though there is increased risk inherent in the strategic planning for 2030 that must be considered when attempting to align ends, ways, and means. The United States adoption of this fast-paced, networked form of warfare generates a significant tax on resources. It is predicated on near-unrestricted access to the air domain and a freedom of movement. Assurance of these current assumptions will require the Air Force to make a significant investment in the recapitalization of fourth-generation hardware. Returning first to Desert Storm, a review of the past twenty years is in order.

The True Cost of Desert Storm

In contrast to conventional wisdom, prosecution of Desert Storm required a considerable percentage of USAF aircraft. While the demands on fighter and attack aircraft appear reasonable on cursory inspection, close evaluation reveals significant disparity in the usage rates across the fleet as a whole. Those aircraft with unique capabilities had less excess

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[4] Randall Collins, "Technological Displacement and Capitalist Crises: Escapes and Dead Ends." (Plenary address to the Hundredth Anniversary Sociological Review Conference, Billesley Manor, UK, June 2009) Political Conceptology: Journal of Metadisciplinary Research, no. 1 (2010): 23-34. Collins describes technological displacement as "the mechanism by which innovations in equipment and organization save labour, thereby enabling fewer employed persons to produce more at lower cost."

capacity than did legacy, multi-mission aircraft. Though the Air Force employed only 30% of the tactical combat-coded inventory, Desert Storm required 84% of electronic attack aircraft, 73% of the precision weapons capable aircraft, and 91% of the conventional weapons capable bombers. Additionally, the Air Force utilized 91% of its inter-theater airlift aircraft and required second-stage supplementation from the Civil Reserve Air Fleet. Despite a nascent 1990 National Military Strategy Document requirement to execute two regional major contingency operations, any attempt to do so would not have looked anything like Desert Storm. While the remaining 70% of tactical aircraft were still available for whatever situation arose, the lack of suppression of enemy air defense, precision targeting, and inter-theater airlift assets severely limited the Air Force ability to project power beyond its existing commitments.

In hindsight, Desert Storm emphasized the importance of stealth, precision munitions, and integrated electronic-warfare capabilities. The peace-dividend budgets of the early 1990s constrained USAF acquisition programs, resulting in modification of existing aircraft through integrated solutions. To increase the capability and survivability of these fourth-generation A-10, F-15, and F-16 tactical aircraft, the Air Force pursued technology improvements incorporated into modular enhancements such as targeting, surveillance, or electronic-attack pods.

Capabilities of Air Force 2010

Today's Air Force is the most capable conventional airpower on the planet, yet still retains its strategic nuclear deterrent capability. It is also the smallest it has ever been. Fifty percent (1,397) of the 2,811 Air Force combat-coded aircraft would have been required in 2010 to execute a Desert Storm equivalent campaign, three hundred fewer than in 1990. This smaller force is largely the result of increased combat effectiveness due to precision munitions and stealth technology incorporated into F-22A and B-2 aircraft. ISR and integrated EW capabilities reduce the need for dedicated SEAD escort and tactical ISR aircraft. Further,

precision-capable platforms, specifically bomber aircraft, free fighter/attack, and supporting tanker assets for other missions. As a result, reduced tactical force structure enables a much leaner, yet more capable airlift and air-refueling mobility component. Remaining Air Force non-deployed combat-coded forces were better positioned in 2010 to respond to other conflicts due to these increased non-committed mobility resources.

While most missions enjoyed reduced requirements due to technology-driven capability increases, the American way of war now places a heavy demand on ISR capability, driving the deployment of nearly twice the number of ISR assets in 2010 as in Desert Storm. The capabilities demonstrated by the operational test E-8 aircraft in 1990 are now essential to American airpower. Persistent, full-motion video has enabled ground forces much greater battle-space awareness, upon which they now rely in many cases, and has led to employment of the MQ-1 armed-intelligence platform, accounting for nearly the entire increase in deployed ISR aircraft.

Comparing the force applied in 1990 to that which might have been required in 2010 is not a task taken lightly. Undoubtedly, the defensive capabilities of the Iraqis, or any other regime in question, would have changed over that period as well. Further, due to changes in where Air Force assets were located throughout the world, it is likely that movement of the required airpower to the Kuwaiti Theater of Operations would entail increased risk in other locations such as the Pacific. This was less of an issue in 1990 since the Air Force tasked most of the required force structure from the Continental United States and Europe, essentially then excess with the Soviet implosion only months prior.

This thesis concludes that the Air Force of 2010 was capable of executing a Desert Storm scenario given the *1-4-2-1* guidance set forth in the 2010 QDR. Pursuit of stealth technologies and integrated electronic warfare upgrades to existing systems allowed the Air Force to increase its

lethality and survivability in increasingly hostile environments. Precision weapons capability integrated into tactical fighter/attack and bomber platforms changed Cold War force planning requirements. Calculations shifted from the number of aircraft required per target to the number of targets an individual aircraft could destroy. Tanker and transport fleets were capably sized to support required tactical and bomber forces. ISR was, and will remain, a key enabler upon which a growing dependence rests. Looking forward to 2030, the Air Force must invest wisely again in the face of budget constraints or risk its ability to support the NMS.

Expectations for 2030

The planned Air Force of 2030 will be capable of providing the combat forces required by a 1-*4-2-1* National Security Strategy based on its analysis of the likely operational environment. The Air Force will continue to leverage technology to maintain a continuing advantage when tasked to provide strategic options. While it is likely that the Air Force of 2030 will be marginally smaller, it will look very similar to the force structure present today. The United States has been, and will continue to be, the global mediator and guarantor for the general welfare of the international order. Absent a fundamental change to the structure of the international order, the United States' National Security Strategy will continue to posture itself to fight a major regional conflict, while deterring conflict in other regions.[5]

Another reason for the similarity in force structure stems from the Air Force need to pursue multi-role aircraft. Quite simply, dedicated mission aircraft are too expensive. The established Air Force baseline requirement for 2,000 tactical aircraft to meet NSS planning directives ensures continued operation of existing fourth-generation aircraft until replacements can be acquired. Due to delays in F-35A production, the

[5] United States, Congressional Research Service, *Quadrennial Defense Review 2010: Overview and Implications for National Security Planning* (R41250, May 17, 2010), by Stephen Daggett, 22.

Air Force is not currently positioned to meet this requirement in the near term, though it can expect an inventory of 1,200 F-35A by 2030.[6]

The Air Force has wagered its ability to defeat the expected threat of 2030 on the F-35A, LRS-B and KC-46A acquisition programs. Its strategic environmental analysis suggests air defense systems will achieve tactical parity with fourth-generation aircraft within the next six years.[7] Further iterative enhancements to lengthen the combat viability of podded fourth-generation aircraft are no longer viable. In order to maintain its long enjoyed continuing advantage, the Air Force must make significant investment in fifth-generation aircraft in its tactical and bomber fleets. As a result, any further delay in the F-35A production schedule, or complications leading to less than anticipated SLEP of A-10, F-15, or F-16 aircraft could result in significant shortfalls in Air Force tactical aircraft capability. The Air Force has essentially bet its future combat effectiveness on the F-35A, while trying to mitigate some risk in the short term by pursuing SLEPs for its fourth-generation aircraft.

The Air Force of 2030 will maintain 4,936 aircraft, 295 aircraft fewer than its 2010 inventory for a reduction of fewer than six percent. Importantly, this inventory relies on the acquisition of three wholly new aircraft: 1,200 F-35A, 179 KC-46A, and 100 LRS-B. In terms of aircraft, it will be the smallest Air Force the United States has ever maintained. Likewise, while it has not been much discussed due to difficulties with projecting manning levels, the personnel force structure will likely be at its smallest ever. As has been seen in the discussion of 2010 force structure, size does not equal capability, though there is some truth to the adage that quantity has a quality all its own.

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[6] United States, General Accounting Office, *Tactical Aircraft: DOD's Ability to Meet Future Requirements Is Uncertain, with Key Analyses Needed to Inform Upcoming Investment Decisions* (GAO-10-789, 29 July 2010), 9-12. http://www.gao.gov/assets/310/308236.pdf (accessed 23 Jan 2012).

[7] John A. Tirpak, "The F-35 or Bust," *AirForce-Magazine.com* (27 April 2012). http://www.airforce-magazine.com/DRArchive/Pages/default.aspx (accessed 27 April 2012).

It was the idea of a different type of war that drove the Airmen of the Army Air Corps to pursue a way over the trenches, rather than through them. It is the idea, as Alexander Wendt argues, that can make all the difference.[8] Ultimately, the technology the Air Force pursues is only as good as the ideas that govern how and when it is employed. As the size and capability of the Air Force changes with respect to the threat expected, so to must the ends the nation desires to pursue lest its appetite outstretch its means. Tomorrow's Air Force will most likely be smaller than today's, yet that does not mean it will be less capable. The ability for the Air Force to fight and defeat the threats to the security of the United States is paramount. The Air Force must remember that "technology is only as effective as the strategy it serves."[9] A balanced force capable of responding to the entire spectrum of conflict is critical to the nation and its pursuit of strategic interest.

[8] Alexander Wendt, *Social Theory of International Politics* (Cambridge: Cambridge University Press, 1999), 374.
[9] Thomas G. Mahnken, *Technology and the American Way of War* (New York: Columbia University Press, 2008), 26.

Appendix A

Terminology for Aircraft Inventory

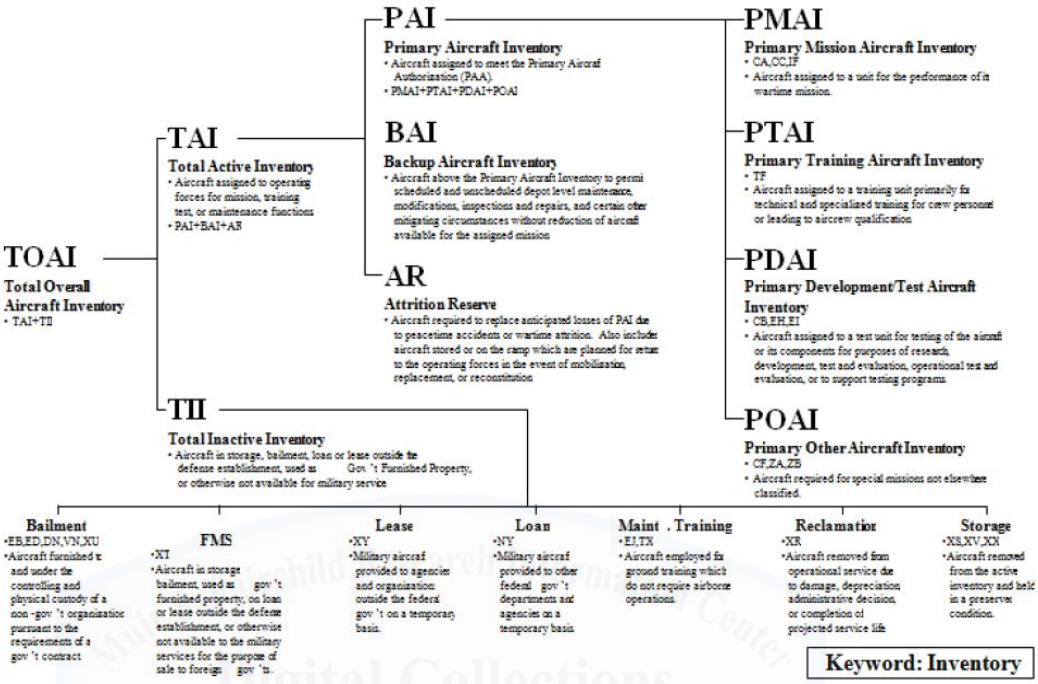

Figure 3 – Terminology For Aircraft Inventory Management
Source: AFI 16-402, Figure A3.1

Appendix B

Comparison of Desert Storm & 2010 Notional Force Structure

	Desert Storm # Used / % PMAI	**Notional 2010** # Used / % PMAI
Total	1696 - 39%	1397 – 50%
Fighter/Attack/EW	*805 – 30%*	678 – 51%
A-10	132 – 34%	96 – 55%
AC-130	4 – 27%	6 – 29%
EC-130	26 – 116%	12 – 76%
EF-111	24 – 100%	76 x F-16CJ – 50%
F-4G	66 – 92%	
F-15C/D	125 – 50%	76 – 47%
F-15E	48 – 64%	72 – 55%
F-16	248 – 26%	340 – 65%
F-22A	n/a	76 – 63%
F-111E	26 – 41%	n/a
F-111F	64 – 96%	n/a
F-117A	42 – 117%	Substitute w/ B-2A
MQ-9	n/a	20 CAPs – 50%
Bomber	*30 – 91%*	46 – 48%
B-1B	n/a	18 – 50%
B-2	n/a	4 – 25%
B-52	30 – 91%	24 – 55%
Tanker	308 – 51%	216 – 51%
KC-10	46 – 81%	36 – 67%
KC-135	262 – 48%	180 – 49%
Transport	481 – 59%	317 – 47%
C-5	118 – 108%	56 – 56%
C-17	n/a	105 – 64%
C-130	168 – 36%	120 – 35%
C-141	195 – 83%	Substitute w/ C-17A
CV-22	n/a	12 – 100%
MC-130	7 – 41%	24 – 56%
ISR	72 – 31%	140 – 49%
E-3	14 – 58%	12 – 50%
E-8	2 – n/a	8 – 47%
MC-12	n/a	16 – 50%
MQ-1	n/a	20 CAPS – 48%
OA-10	12 – 57%	n/a
RC-135	11 – 79%	12 – 55%
RF-4	24 – 16%	Substitute w/ MQ-1
RQ-4	n/a	12 – 67%
TR-1	4 – 25%	n/a
U-2	5 – 42%	8 – 30%

Appendix C

Complete Data Tables: 1950 – 2010 & 2030 Estimate

	FY50	FY51	FY52	FY53	FY54	FY55	FY56	FY57	FY58	FY59	FY60	FY61
ICBMs	0	0	0	0	0	0	0	0	0	0	0	0
USAF Aircraft Inventory (TAI)												
Active	8,716	12,800	15,264	17,497	18,697	20,002	23,212	22,116	18,856	17,357	15,313	13,890
Reserve	949	144	7	370	485	632	754	753	659	779	820	863
ANG	2,654	583	961	1,340	1,728	1,908	2,138	2,170	2,425	2,325	2,168	1,932
Total	12,319	13,527	16,232	15,207	20,910	22,542	26,104	25,039	21,944	20,461	18,301	16,685
Combat Coded												
FIGHTERS/ATTACK/EW												
Active	1,821	3,440	3,753	4,586	5,407	5,975	7,746	7,302	5,568	4,580	3,522	3,457
Reserve	1	0	0	100	109	170	165	114	0	0	50	61
ANG	1,802	388	541	694	1,021	1,311	1,442	1,460	1,774	1,680	1,516	1,235
Total	3,624	3,828	4,294	5,380	6,537	7,456	9,353	8,876	7,342	6,660	5,488	4,753
Combat Coded												
A-10												
Active												
Reserve												
ANG												
Total												
Combat Coded (70% HA)												
AC-130												
Active												
Reserve												
ANG												
Total												
Combat Coded (75% HA)												
EC-130												
Active												
Reserve												
ANG												
Total												
Combat Coded (75% HA)												
EF-111												
Active												
Reserve												
ANG												
Total												
Combat Coded												
F-4												
Active												
Reserve												
ANG												
Total												
Combat Coded												
F-15												
Active												
Reserve												
ANG												
F-15A/B												
F-15C/D												
F-15 A/B/C/D Combat Coded												
F-15 E												
F-15E Combat Coded												
Total												
Combat Coded (60% HA)												
F-16												
Active												
Reserve												
ANG												
Total												
Combat Coded (60% HA)												
F-22A												
Active												
Reserve												
ANG												
Total												
Combat Coded												
F-35A												
Active												
Reserve												
ANG												
Total												
Combat Coded (75%)												
F-111												
Active												
Reserve												
ANG												
F-111E												
Combat Coded												
F-111F												
Combat Coded												
Total												
Combat Coded												
F-117												
Active												
Reserve												
ANG												
Total												
Combat Coded												

	FY50	FY51	FY52	FY53	FY54	FY55	FY56	FY57	FY58	FY59	FY60	FY61
MQ-9												
Active												
Reserve												
ANG												
Total Combat Coded												
BOMBERS												
Active	853	1,314	1,601	1,570	1,534	1,688	2,282	2,334	2,276	2,234	2,194	1,947
Reserve	85	0	1	5	12	23	79	3	0	0	0	0
ANG	198	8	20	32	62	0	89	52	46	35	0	2
Total Combat Coded (Conventional)	1,140	1,322	1,622	1,611	1,608	1,711	2,450	2,389	2,322	2,273	2,194	1,949
B-1												
Active												
Reserve												
ANG												
Total Combat Coded (Conventional)												
B-2												
Active												
Reserve												
ANG												
Total Combat Coded												
B-52												
Active							42	170	358	478	580	629
Reserve												
ANG												
Total Combat Coded (Conventional)							42	170	358	478	580	629
LRS-B												
Active												
Reserve												
ANG												
Total Combat Coded												
TANKERS												
Active	84	172	265	476	638	745	907	932	1,023	1,190	1,230	1,265
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	15
Total Combat Coded	84	172	265	476	638	745	907	932	1,023	1,190	1,230	1,280
KC-10												
Active												
Reserve												
ANG												
Total Combat Coded												
KC-46												
Active												
Reserve												
ANG												
Total Combat Coded												
KC-135												
Active								12	103	281	383	458
Reserve												
ANG												
Total Combat Coded								12	103	281	383	458
TRANSPORTS												
Active	2,466	2,858	2,968	3,429	3,600	3,702	3,798	3,727	3,334	2,788	2,545	2,396
Reserve	50	5	1	116	181	249	305	488	599	721	713	745
ANG	181	91	88	86	95	96	168	170	181	183	163	224
Total Combat Coded	2,697	2,954	3,057	3,631	3,876	4,047	4,271	4,385	4,114	3,692	3,425	3,365
C-5												
Active												
Reserve												
ANG												
Total Combat Coded (12PMAI/Sq)												
C-17												
Active												
Reserve												
ANG												
Total Combat Coded												
C-27J												
Active												
Reserve												
ANG												
Total Combat Coded												
C-130												
Active							29	112	185	211	253	278
Reserve												
ANG												
C-130H												
C-130J												
Total Combat Coded							29	112	185	211	253	278

	FY50	FY51	FY52	FY53	FY54	FY55	FY56	FY57	FY58	FY59	FY60	FY61
C-141												
Active												
Reserve												
ANG												
Total												
Combat Coded												
CV-22												
Active												
Reserve												
ANG												
Total												
Combat Coded												
MC-130												
Active												
Reserve												
ANG												
Total												
Combat Coded (75% HA)												
ISR												
Active	255	430	557	630	778	1,001	1,267	1,117	944	887	685	616
Reserve	0	0	0	0	0	1	0	0	0	0	0	0
ANG	15	0	10	20	31	72	96	160	140	152	226	212
Total	270	430	567	650	809	1,074	1,363	1,277	1,084	1,039	911	828
Combat Coded												
E-3												
Active												
Reserve												
ANG												
Total												
Combat Coded												
E-8												
Active												
Reserve												
ANG												
Total												
Combat Coded												
MC-12												
Active												
Reserve												
ANG												
Total												
Combat Coded												
MQ-1												
Active												
Reserve												
ANG												
Total												
Combat Coded												
OA-10												
Active												
Reserve												
ANG												
Total												
Combat Coded												
RC-135												
Active												
Reserve												
ANG												
Total												
Combat Coded												
RF-4												
Active												
Reserve												
ANG												
Total												
Combat Coded												
RQ-4												
Active												
Reserve												
ANG												
Total												
Combat Coded												
TR-1												
Active												
Reserve												
ANG												
Total												
Combat Coded												
U-2												
Active												
Reserve												
ANG												
Total												
Combat Coded												
E-4												
Active												
Reserve												
ANG												
Total												
Combat Coded												

	FY50	FY51	FY52	FY53	FY54	FY55	FY56	FY57	FY58	FY59	FY60	FY61
HELICOPTERS												
Active	87	83	136	234	308	425	411	362	325	298	257	283
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	87	83	136	234	308	425	411	362	325	298	257	283
TRAINER												
Active	2,850	4,136	5,127	5,805	5,772	5,816	5,923	5,695	4,726	4,268	3,514	3,413
Reserve	809	135	5	145	183	189	203	135	45	37	32	32
ANG	458	96	301	506	517	427	331	311	247	230	218	197
Total	4,117	4,371	5,433	6,456	6,472	6,432	6,457	6,141	5,018	4,535	4,164	3,642
SEARCH/RESCUE												
Active	139	155	242	252	259	269	354	375	345	343	244	205
Reserve	0	0	0	0	0	0	2	13	15	21	25	25
ANG	0	0	0	0	0	0	12	17	41	41	45	47
Total	139	155	242	252	259	269	408	405	405	405	314	277
LIAISON												
Active	161	208	615	515	401	381	483	272	311	197	146	100
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	161	208	615	515	401	381	483	272	311	197	146	100
SPECIAL RESEARCH												
Active	0	0	0	0	0	0	1	0	0	0	2	3
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	0	2	3
UTILITY/OBSERVE/OTHER												
Active	0	0	0	0	0	0	0	0	0	172	170	205
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	1	2	2	2	0	0	0	0	0	0
Total	0	0	1	2	2	2	0	0	0	172	170	205
Active Force	565277	1049381	1253261	1355553	1318918	1356946	1242958	1336835	1244156	1204435	1169752	1167151
USAF Active Duty	411277	768381	983261	977553	947918	959946	905958	919835	871156	840435	814752	821151
USAF Active Civilians	154000	281000	310000	382000	371000	397000	333000	417000	373000	364000	355000	346000
Civilians % of Active Force	27.2%	26.9%	24.8%	28.1%	28.1%	29.3%	26.8%	31.2%	30.0%	30.2%	30.3%	29.6%
Officers												
Line Officers												
Pilots												
Navigators/Observers												
Air Battle Managers												
Rated Officers % of Total Officers												
Air Reserve Force (AFRES + ANG)												
USAF TFI (Active, AFRES + ARF)												
Active % of TFI												
USG Budget (CY $B)	127.72	51.20	76.20	79.89	78.80	82.28	73.30	81.84	88.05	100.44	99.57	101.73
Defense Budget (CY $B)	13.15	21.00	49.70	48.30	49.10	40.64	41.40	42.79	45.22	46.35	45.91	46.13
Defense Budget % USG	10.3%	41.0%	65.2%	60.5%	62.3%	49.4%	56.5%	52.3%	51.3%	46.1%	46.1%	45.3%
GDP ($B)	273.10	320.20	348.70	372.50	377.00	395.50	427.00	450.90	460.00	490.20	518.90	529.90
USG Outlays (CY $B)	42.56	45.51	67.69	76.10	70.86	68.44	70.64	76.58	82.41	92.10	92.15	97.72
Defense Outlays (CY $B)	13.72	23.57	46.09	52.80	49.27	42.73	42.52	45.43	46.82	49.02	48.13	49.60
Defense Outlays % USG	32.2%	51.8%	68.1%	69.4%	69.5%	62.4%	60.2%	59.3%	56.8%	53.2%	52.2%	50.8%
Defense Outlays % GDP	5.0%	7.4%	13.2%	14.2%	13.1%	10.8%	10.0%	10.1%	10.2%	10.0%	9.3%	9.4%
Human Resource Outlays (CY$B)	14.22	11.00	11.75	11.84	13.08	14.91	16.05	18.16	22.25	24.85	26.18	25.84
Human Resource Outlays % USG	33.4%	24.2%	17.4%	15.6%	18.5%	21.8%	22.7%	23.7%	27.0%	27.0%	28.4%	30.5%
Human Resource Outlays % GDP	5.2%	3.4%	3.4%	3.2%	3.5%	3.8%	3.8%	4.0%	4.8%	5.1%	5.0%	5.6%
DoD Budget Authority (CY $B)	14.09	47.53	60.20	48.60	34.32	30.43	32.79	35.92	36.97	41.40	40.91	41.39
DoD Outlays (CY $B)	11.67	19.57	38.72	43.41	40.06	35.17	35.40	38.10	39.15	41.47	41.45	43.29
USAF Budget Authority ($B)	5.36	15.14	22.32	20.43	11.54	12.03	15.37	17.57	17.80	18.86	18.58	17.90
USAF Budget Authority % DoD	40.8%	72.1%	44.9%	42.3%	23.5%	29.6%	37.1%	41.1%	39.4%	40.7%	40.5%	38.8%
USAF Outlays ($B)	3.52	6.25	12.65	15.14	15.59	16.23	16.61	18.24	18.41	19.25	19.25	19.80
USAF Outlays % Defense	25.6%	26.7%	27.4%	28.7%	31.6%	38.0%	39.1%	40.1%	39.3%	39.3%	40.1%	39.9%

	FY62	FY63	FY64	FY65	FY66	FY67	FY68	FY69	FY70	FY71	FY72	FY73
ICBMs	88	236	340	854	934	1054	1054	1054	1054	1054	1054	1054
USAF Aircraft Inventory (TAI)												
Active	14,462	13,675	12,689	12,280	11,709	11,852	12,560	12,186	11,222	10,294	9,403	8,503
Reserve	693	573	716	617	514	457	445	403	372	336	354	429
ANG	1,198	1,559	1,806	1,767	1,752	1,807	1,417	1,641	1,885	1,881	1,887	1,817
Total	16,353	15,811	15,211	14,664	13,975	14,156	14,422	14,230	13,479	12,511	11,644	10,749
Combat Coded												
FIGHTERS/ATTACK/EW												
Active	3,895	3,720	3,538	3,643	3,547	3,632	4,004	3,844	3,407	3,058	2,659	2,520
Reserve	0	2	0	0	0	2	19	18	23	82	111	161
ANG	657	852	1,055	1,036	1,052	1,033	725	822	990	1,024	1,068	1,096
Total	4,552	4,574	4,593	4,679	4,599	4,667	4,748	4,684	4,420	4,164	3,838	3,777
Combat Coded												
A-10												
Active												2
Reserve												
ANG												
Total												2
Combat Coded (70% HA)												
AC-130												
Active								7	7	16	21	23
Reserve												
ANG												
Total								7	7	16	21	23
Combat Coded (75% HA)												
EC-130												
Active												
Reserve												
ANG												
Total												
Combat Coded (75% HA)												
EF-111												
Active												
Reserve												
ANG												
Total												
Combat Coded												
F-4												
Active		24	129	402	607	1,006	1,254	1,396	1,462	1,535	1,404	1,386
Reserve												
ANG											10	10
Total		24	129	402	607	1,006	1,254	1,396	1,462	1,535	1,414	1,396
Combat Coded												
F-15												
Active												
Reserve												
ANG												
F-15A/B												
F-15C/D												
F-15 A/B/C/D Combat Coded												
F-15 E												
F-15E Combat Coded												
Total												
Combat Coded (60% HA)												
F-16												
Active												
Reserve												
ANG												
Total												
Combat Coded (60% HA)												
F-22A												
Active												
Reserve												
ANG												
Total												
Combat Coded												
F-35A												
Active												
Reserve												
ANG												
Total												
Combat Coded (75%)												
F-111												
Active				3	11	20	49	128	179	235	324	374
Reserve												
ANG												
F-111E												
Combat Coded												
F-111F												
Combat Coded												
Total				3	11	20	49	128	179	235	324	374
Combat Coded												
F-117												
Active												
Reserve												
ANG												
Total												
Combat Coded												

	FY62	FY63	FY64	FY65	FY66	FY67	FY68	FY69	FY70	FY71	FY72	FY73
MQ-9												
Active												
Reserve												
ANG												
Total												
Combat Coded												
BOMBERS												
Active	1,851	1,672	1,509	1,245	845	818	779	732	570	622	558	520
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	4	2	2	0	0	0	0	0	0	0	16	16
Total	1,855	1,674	1,511	1,245	845	818	779	732	570	622	574	536
Combat Coded (Conventional)												
B-1												
Active												
Reserve												
ANG												
Total												
Combat Coded (Conventional)												
B-2												
Active												
Reserve												
ANG												
Total												
Combat Coded												
B-52												
Active	697	708	705	702	666	649	628	588	518	512	459	433
Reserve												
ANG												
Total	697	708	705	702	666	649	628	588	518	512	459	433
Combat Coded (Conventional)												
LRS-B												
Active												
Reserve												
ANG												
Total												
Combat Coded												
TANKERS												
Active	1,258	1,101	998	837	739	740	730	722	735	734	730	718
Reserve	0	0	0	0	4	0	0	0	0	0	5	10
ANG	64	130	62	60	53	55	55	54	77	77	77	77
Total	1,322	1,231	1,060	897	796	795	785	776	812	811	812	805
Combat Coded												
KC-10												
Active												
Reserve												
ANG												
Total												
Combat Coded												
KC-46												
Active												
Reserve												
ANG												
Total												
Combat Coded												
KC-135												
Active	513	602	677	687	684	676	667	662	663	659	660	660
Reserve												
ANG												
Total	513	602	677	687	684	676	667	662	663	659	660	660
Combat Coded												
TRANSPORTS												
Active	2,504	2,510	2,327	2,366	2,238	2,145	2,322	2,052	1,851	1,509	1,466	1,172
Reserve	645	530	664	581	469	462	354	345	284	213	197	212
ANG	178	188	285	299	300	338	303	296	302	276	265	215
Total	3,327	3,228	3,276	3,246	3,007	2,945	3,019	2,693	2,437	1,998	1,928	1,599
Combat Coded												
C-5												
Active									12	38	57	77
Reserve												
ANG												
Total									12	38	57	77
Combat Coded (12PMAI/Sq)												
C-17												
Active												
Reserve												
ANG												
Total												
Combat Coded												
C-27J												
Active												
Reserve												
ANG												
Total												
Combat Coded												
C-130												
Active	330	405	550	619	617	607	580	563	540	446	384	349
Reserve							8	9	23	69	101	103
ANG									12	46	69	66
C-130H												
C-130J												
Total	330	405	550	619	617	607	588	572	575	561	554	518
Combat Coded												

		FY62	FY63	FY64	FY65	FY66	FY67	FY68	FY69	FY70	FY71	FY72	FY73
C-141													
Active				6	26	118	226	281	281	281	281	281	278
Reserve													
ANG													
	Total			6	26	118	226	281	281	281	281	281	278
	Combat Coded												
CV-22													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
MC-130													
Active													
Reserve													
ANG													
	Total												
	Combat Coded (75% HA)												
ISR													
Active		721	655	595	538	732	858	983	1,063	593	841	750	687
Reserve		0	0	0	0	0	0	0	0	6	5	14	13
ANG		113	188	192	184	164	182	166	236	238	202	168	146
	Total	834	843	787	722	896	1,040	1,149	1,299	1,237	1,052	932	846
	Combat Coded												
E-3													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
E-8													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
MC-12													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
MQ-1													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
OA-10													
Active								27	151	131	117	101	92
Reserve													
ANG													
	Total							27	151	131	117	101	92
	Combat Coded												
RC-135													
Active				5	14	18	25	25	23	24	24	25	26
Reserve													
ANG													
	Total			5	14	18	25	25	23	24	24	25	26
	Combat Coded												
RF-4													
Active				2	57	178	270	306	327	373	358	326	324
Reserve													
ANG											24	53	58
	Total			2	57	178	270	306	327	373	382	379	382
	Combat Coded												
RQ-4													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
TR-1													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
U-2													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
E-4													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												

	FY62	FY63	FY64	FY65	FY66	FY67	FY68	FY69	FY70	FY71	FY72	FY73
HELICOPTERS												
Active	288	418	401	386	418	466	465	480	456	500	493	391
Reserve	0	0	0	0	0	0	0	0	0	5	23	29
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	288	418	401	386	418	466	465	480	456	505	516	420
TRAINER												
Active	3,425	3,158	2,873	2,782	2,646	2,599	2,584	2,744	2,627	2,623	2,454	2,271
Reserve	30	26	32	17	14	0	0	1	0	0	0	4
ANG	141	160	169	149	142	146	126	140	141	131	125	109
Total	3,600	3,344	3,074	2,948	2,802	2,745	2,710	2,885	2,768	2,754	2,579	2,384
SEARCH/RESCUE												
Active	197	90	100	110	74	55	28	13	15	7	5	2
Reserve	18	15	20	19	27	33	32	39	39	26	4	0
ANG	41	39	17	18	16	15	18	18	17	11	0	0
Total	256	144	137	147	117	103	78	70	71	44	9	2
LIAISON												
Active	116	0	0	0	0	0	0	0	0	0	0	0
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	116	0	0	0	0	0	0	0	0	0	0	0
SPECIAL RESEARCH												
Active	3	3	3	5	4	7	5	2	0	0	0	1
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	3	3	5	4	7	5	2	0	0	0	1
UTILITY/OBSERVE/OTHER												
Active	200	352	345	368	466	572	660	534	568	400	288	221
Reserve	0	0	0	0	0	0	0	0	20	1	0	0
ANG	0	0	24	21	25	38	24	75	120	160	168	158
Total	200	352	369	389	491	610	684	609	708	561	456	379
Active Force	1233025	1206431	1178798	1141662	1223353	1246454	1243850	1211353	1119349	1068300	1025838	979182
USAF Active Duty	884025	869431	856798	824662	887353	897454	904850	862353	791349	755300	725838	691182
USAF Active Civilians	349000	337000	322000	317000	336000	349000	339000	349000	328000	313000	300000	288000
Civilians % of Active Force	28.3%	27.9%	27.3%	27.8%	27.5%	28.0%	27.3%	28.8%	29.3%	29.3%	29.2%	29.4%
Officers												
Line Officers												
Pilots												
Navigators/Observers												
Air Battle Managers												
Rated Officers % of Total Officers												
Air Reserve Force (AFRES + ANG)												
USAF TFI (Active, AFRES + ARF)												
Active % of TFI												
USG Budget (CY $B)	114.28	121.59	127.72	126.53	140.21	167.61	175.64	183.70	197.89	212.76	236.61	249.80
Defense Budget (CY $B)	51.58	53.44	56.16	52.97	57.44	71.36	76.49	81.00	79.43	76.44	78.03	76.44
Defense Budget % USG	45.1%	44.0%	44.0%	41.9%	41.0%	42.6%	43.5%	44.1%	40.1%	35.9%	33.0%	30.6%
GDP ($B)	567.80	599.20	641.50	687.50	755.80	810.00	868.40	948.10	1012.70	1080.00	1176.50	1310.60
USG Outlays (CY $B)	106.82	111.32	118.53	118.23	134.53	157.46	178.13	183.64	195.65	210.17	230.68	245.71
Defense Outlays (CY $B)	52.35	53.40	54.76	50.62	58.11	71.42	81.93	82.50	81.69	78.87	79.17	76.68
Defense Outlays % USG	49.0%	48.0%	46.2%	42.8%	43.2%	45.4%	46.0%	44.9%	41.8%	37.5%	34.3%	31.2%
Defense Outlays % GDP	9.2%	8.9%	8.5%	7.4%	7.7%	8.8%	9.4%	8.7%	8.1%	7.3%	6.7%	5.9%
Human Resource Outlays (CY$B)	31.63	33.52	35.29	36.58	43.26	51.27	29.38	66.41	75.35	91.90	107.21	119.52
Human Resource Outlays % USG	29.6%	30.1%	29.8%	30.9%	32.2%	32.6%	16.5%	36.2%	38.5%	43.7%	46.5%	48.6%
Human Resource Outlays % GDP	5.6%	5.6%	5.5%	5.3%	5.7%	6.3%	3.4%	7.0%	7.4%	8.5%	9.1%	9.1%
DoD Budget Authority (CY $B)	48.01	49.56	49.63	49.06	63.56	72.18	76.29	76.91	74.08	71.16	75.01	77.56
DoD Outlays (CY $B)	46.83	47.94	49.47	45.88	54.09	67.36	77.27	77.79	77.07	74.47	75.08	73.22
USAF Budget Authority ($B)	19.42	20.15	19.39	19.15	22.59	24.20	25.36	27.72	23.36	22.48	23.25	23.93
USAF Budget Authority % DoD	37.7%	37.7%	34.5%	36.1%	39.3%	33.9%	33.2%	34.2%	29.4%	29.4%	29.8%	31.3%
USAF Outlays ($B)	20.79	20.61	20.46	18.15	20.07	22.91	25.73	25.89	24.87	23.78	24.00	23.63
USAF Outlays % Defense	39.7%	38.6%	37.4%	35.8%	34.5%	32.1%	31.4%	31.4%	30.4%	30.1%	30.3%	30.8%

	FY74	FY75	FY76	FY77	FY78	FY79	FY80	FY81	FY82	FY83	FY84	FY85
ICBMs	1054	1054	1054	1054	1054	1054	1054	1054	1052	1043	1032	1021
USAF Aircraft Inventory (TAI)												
Active	8,110	7,238	7,200	7,242	7,121	6,950	7,017	7,050	7,106	7,165	7,239	7,281
Reserve	434	445	445	460	460	470	474	452	447	458	464	468
ANG	1,747	1,646	1,622	1,575	1,557	1,530	1,560	1,636	1,647	1,703	1,688	1,688
Total	10,291	9,333	9,267	9,277	9,138	8,950	9,051	9,138	9,200	9,326	9,391	9,437
Combat Coded												
FIGHTERS/ATTACK/EW												
Active	2,441	2,301	2,498	2,608	2,662	2,632	2,785	2,866	2,930	3,027	3,062	3,111
Reserve	156	184	177	174	181	187	151	156	227	235	248	247
ANG	1,018	950	899	877	851	819	853	945	999	1,071	1,085	1,093
Total	3,615	3,435	3,574	3,659	3,694	3,638	3,829	4,007	4,156	4,333	4,395	4,451
Combat Coded												
A-10												
Active	2	5	15	66	139	212	309	373	430	457	464	460
Reserve							5	50	82	97	100	99
ANG						31	72	97	104	107	106	106
Total	2	5	15	66	139	243	386	520	616	661	670	665
Combat Coded (70% HA)												
AC-130												
Active	20	12	10	10	10	10	10	10	10	10	10	10
Reserve	11	11	10	10	10	10	10	10	10	10	10	10
ANG												
Total	31	23	20	20	20	20	20	20	20	20	20	20
Combat Coded (75% HA)												
EC-130												
Active				7	8	8	14	14	14	14	14	14
Reserve												
ANG												
Total				7	8	8	14	14	14	14	14	14
Combat Coded (75% HA)												
EF-111												
Active		2	2	2	2	2	2	2	8	16	29	40
Reserve												
ANG												
Total		2	2	2	2	2	2	2	8	16	29	40
Combat Coded												24
F-4												
Active	1,350	1,356	1,418	1,398	1,348	1,174	1,078	951	805	704	662	624
Reserve					9	20	31	62	110	113	112	112
ANG	15	18	26	60	85	213	267	329	416	497	515	522
Total	1,365	1,374	1,444	1,458	1,442	1,407	1,376	1,342	1,331	1,314	1,289	1,258
Combat Coded												
F-15												
Active	16	29	79	235	321	428	505	584	634	663	699	719
Reserve												
ANG												12
F-15A/B												
F-15C/D												
F-15 A/B/C/D Combat Coded												
F-15 E												
F-15E Combat Coded												
Total	16	29	79	235	321	428	505	584	634	663	699	731
Combat Coded (60% HA)												
F-16												
Active		2	2	6	11	50	156	306	444	577	671	787
Reserve										1	26	26
ANG										16	26	26
Total		2	2	6	11	50	156	306	444	594	723	839
Combat Coded (60% HA)												
F-22A												
Active												
Reserve												
ANG												
Total												
Combat Coded												
F-35A												
Active												
Reserve												
ANG												
Total												
Combat Coded (75%)												
F-111												
Active	365	376	377	378	372	362	354	350	338	324	310	298
Reserve												
ANG												
F-111E												
Combat Coded												
F-111F												
Combat Coded												
Total	365	376	377	378	372	362	354	350	338	324	310	298
Combat Coded												
F-117												
Active												
Reserve												
ANG												
Total												
Combat Coded												

	FY74	FY75	FY76	FY77	FY78	FY79	FY80	FY81	FY82	FY83	FY84	FY85
MQ-9												
Active												
Reserve												
ANG												
Total												
Combat Coded												
BOMBERS												
Active	483	497	493	489	448	417	414	412	391	338	328	330
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	20	0	0	0	0	0	0	0	0	0	0	0
Total	503	497	493	489	448	417	414	412	391	338	328	330
Combat Coded (Conventional)												
B-1												
Active			3	3	3	2	2	2	2	3	2	5
Reserve												
ANG												
Total			3	3	3	2	2	2	2	3	2	5
Combat Coded (Conventional)			0	0	0	0	0	0	0	0	0	0
B-2												
Active												
Reserve												
ANG												
Total												
Combat Coded												
B-52												
Active	403	426	421	418	378	349	347	347	326	273	264	263
Reserve												
ANG												
Total	403	426	421	418	378	349	347	347	326	273	264	263
Combat Coded (Conventional)												
LRS-B												
Active												
Reserve												
ANG												
Total												
Combat Coded												
TANKERS												
Active	717	701	663	604	562	560	564	570	578	581	591	596
Reserve	10	12	14	30	38	40	40	39	39	39	39	38
ANG	77	84	111	105	112	112	112	112	108	111	107	112
Total	804	797	788	739	712	712	716	721	725	731	737	746
Combat Coded												
KC-10												
Active								5	11	18	25	36
Reserve												
ANG												
Total								5	11	18	25	36
Combat Coded												
KC-46												
Active												
Reserve												
ANG												
Total												
Combat Coded												
KC-135												
Active	657	657	622	567	525	525	529	529	531	528	531	523
Reserve				16	24	24	24	24	24	24	24	24
ANG		1	32	70	104	104	104	104	100	103	99	104
Total	657	658	654	653	653	653	657	657	655	655	654	651
Combat Coded												
TRANSPORTS												
Active	1,096	928	889	899	860	856	851	845	851	845	884	882
Reserve	225	229	230	221	212	212	210	186	151	153	146	152
ANG	237	194	203	214	226	221	214	214	213	213	211	217
Total	1,558	1,351	1,322	1,334	1,298	1,289	1,275	1,245	1,215	1,215	1,241	1,251
Combat Coded												
C-5												
Active	78	76	77	77	77	77	77	77	77	77	77	69
Reserve												5
ANG												3
Total	78	76	77	77	77	77	77	77	77	77	77	77
Combat Coded (12PMAI/Sq)												
C-17												
Active												
Reserve												
ANG												
Total												
Combat Coded												
C-27J												
Active												
Reserve												
ANG												
Total												
Combat Coded												
C-130												
Active	349	322	313	292	284	282	278	279	277	269	268	268
Reserve	112	132	134	125	117	117	120	122	129	140	142	143
ANG	70	107	138	159	171	171	179	179	175	174	173	175
C-130H												
C-130J												
Total	531	561	585	576	572	570	577	580	581	583	583	586
Combat Coded												

		FY74	FY75	FY76	FY77	FY78	FY79	FY80	FY81	FY82	FY83	FY84	FY85
C-141													
Active		280	278	278	276	276	275	275	274	272	272	271	271
Reserve													
ANG													
	Total	280	278	278	276	276	275	275	274	272	272	271	271
	Combat Coded												
CV-22													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
MC-130													
Active					15	15	15	15	10	15	22	21	23
Reserve													
ANG													
	Total				15	15	15	15	10	15	22	21	23
	Combat Coded (75% HA)												
ISR													
Active		567	582	495	488	480	426	453	481	494	506	511	513
Reserve		13	7	7	19	12	7	7	7	7	7	7	7
ANG		146	168	176	180	171	176	183	181	163	160	160	158
	Total	726	757	678	687	663	609	683	669	664	673	678	678
	Combat Coded												
E-3													
Active					9	14	20	23	25	28	31	34	34
Reserve													
ANG													
	Total				9	14	20	23	25	28	31	34	34
	Combat Coded												
E-8													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
MC-12													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
MQ-1													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
OA-10													
Active		91	90	90	89	86	85	79	78	77	77	77	77
Reserve													
ANG													
	Total	91	90	90	89	86	85	79	78	77	77	77	77
	Combat Coded												
RC-135													
Active		26	26	26	26	25	24	19	19	19	19	19	19
Reserve													
ANG													
	Total	26	26	26	26	25	24	19	19	19	19	19	19
	Combat Coded												
RF-4													
Active		323	307	241	227	219	189	186	182	182	181	180	180
Reserve													
ANG		60	71	134	136	135	157	157	156	155	152	152	150
	Total	383	378	375	363	354	346	343	338	337	333	332	330
	Combat Coded												
RQ-4													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
TR-1													
Active										4	7	9	13
Reserve													
ANG													
	Total									4	7	9	13
	Combat Coded												
U-2													
Active			20	19	17	16	16						
Reserve													
ANG													
	Total		20	19	17	16	16						
	Combat Coded												
E-4													
Active			3	4	4	4	4	4	4	4	4	4	4
Reserve													
ANG													
	Total		3	4	4	4	4	4	4	4	4	4	4
	Combat Coded												

	FY74	FY75	FY76	FY77	FY78	FY79	FY80	FY81	FY82	FY83	FY84	FY85
HELICOPTERS												
Active	317	269	254	254	246	230	230	230	227	236	237	234
Reserve	26	13	13	12	13	20	24	24	23	24	24	24
ANG	12	23	29	29	28	30	11	12	11	11	11	11
Total	355	305	296	295	287	280	265	266	261	271	272	269
TRAINER												
Active	2,352	1,861	1,800	1,771	1,741	1,706	1,680	1,646	1,633	1,626	1,624	1,615
Reserve	4	4	4	4	4	4	2	0	0	0	0	0
ANG	81	72	60	49	48	54	54	49	48	47	44	44
Total	2,437	1,937	1,864	1,824	1,793	1,764	1,736	1,695	1,681	1,673	1,668	1,659
SEARCH/RESCUE												
Active	2	0	0	0	0	0	0	0	0	0	0	0
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	0	0	0	0	0	0	0	0	0	0	0
LIAISON												
Active	0	0	0	0	0	0	0	0	0	0	0	0
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
SPECIAL RESEARCH												
Active	0	0	0	0	0	0	0	0	2	2	2	0
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	2	2	2	0
UTILITY/OBSERVE/OTHER												
Active	135	99	108	129	122	123	0	0	0	0	0	0
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	156	155	144	121	121	118	133	123	105	90	70	53
Total	291	254	252	250	243	241	133	123	105	90	70	53
Active Force	932570	850751	847416	825695	820712	804455	801969	816302	830845	843044	850125	865515
USAF Active Duty	643970	612751	585416	570695	569712	559455	557969	570302	582845	592044	597125	601515
USAF Active Civilians	289000	278000	262000	255000	251000	245000	244000	246000	248000	251000	253000	264000
Civilians % of Active Force	31.0%	31.2%	30.9%	30.9%	30.6%	30.5%	30.4%	30.1%	29.8%	29.8%	29.8%	30.5%
Officers												
Line Officers												
Pilots												
Navigators/Observers												
Air Battle Managers												
Rated Officers % of Total Officers												
Air Reserve Force (AFRES + ANG)												
USAF TFI (Active, AFRES + ARF)												
Active % of TFI												
USG Budget (CY $B)	274.70	313.45	469.18	516.76	504.57	558.83	670.06	740.30	806.52	869.84	923.38	1028.94
Defense Budget (CY $B)	80.60	85.30	109.04	121.86	117.23	126.47	143.86	180.00	216.55	245.04	265.16	294.65
Defense Budget % USG	29.3%	27.2%	23.2%	23.6%	23.2%	22.6%	21.5%	24.3%	26.8%	28.2%	28.7%	28.6%
GDP ($B)	1438.50	1560.20	1967.80	2203.20	2217.50	2501.40	2724.20	3057.00	3223.70	3440.70	3844.40	4146.30
USG Outlays (CY $B)	269.36	332.33	419.78	457.21	458.75	504.03	590.54	678.24	745.74	808.36	851.36	946.34
Defense Outlays (CY $B)	79.35	86.51	100.75	108.38	104.50	116.34	134.00	157.51	185.31	209.90	227.41	252.74
Defense Outlays % USG	29.5%	26.0%	24.0%	23.7%	22.8%	23.1%	22.7%	23.2%	24.8%	26.0%	26.7%	26.7%
Defense Outlays % GDP	5.5%	5.5%	5.1%	4.9%	4.7%	4.7%	4.9%	5.2%	5.7%	6.1%	5.9%	6.1%
Human Resource Outlays (CY$B)	135.78	173.25	229.63	247.93	242.33	267.57	313.37	362.02	388.68	426.00	432.03	471.58
Human Resource Outlays % USG	50.4%	52.1%	54.7%	54.2%	52.8%	53.1%	53.0%	53.4%	52.1%	52.7%	50.7%	49.8%
Human Resource Outlays % GDP	9.4%	11.1%	11.7%	11.3%	10.9%	10.7%	11.5%	11.8%	12.1%	12.4%	11.2%	11.4%
DoD Budget Authority (CY $B)	80.99	85.66	95.51	108.34	115.32	125.00	142.62	178.37	213.75	239.47	258.15	286.80
DoD Outlays (CY $B)	77.55	84.90	87.89	95.56	103.04	115.01	132.84	156.15	184.52	205.04	220.81	245.37
USAF Budget Authority ($B)	24.67	25.97	28.44	31.97	32.60	34.94	41.72	53.14	64.82	74.07	86.11	99.42
USAF Budget Authority % DoD	30.6%	30.4%	26.1%	26.2%	27.8%	27.6%	29.0%	29.5%	29.9%	30.2%	32.5%	33.7%
USAF Outlays ($B)	23.93	25.04	26.45	27.92	29.22	32.28	38.58	45.16	55.68	62.89	68.62	81.99
USAF Outlays % Defense	30.2%	28.9%	26.2%	25.8%	28.0%	27.7%	29.1%	28.7%	30.0%	30.0%	30.2%	32.4%

	FY86	FY87	FY88	FY89	FY90	FY91	OD$ Avail	OD$	FY92	FY93	FY94	FY95
ICBMs	988	977	996	1000	1000	1000			925	672	550	580
USAF Aircraft Inventory (TAI)												
Active	7,322	7,267	7,256	7,025	6,604	5,951	5,209		5,343	4,858	4,672	4,604
Reserve	467	502	491	497	593	623	432		550	640	554	542
ANG	1,782	1,732	1,730	1,747	1,710	1,795	1,390		1,695	1,655	1,588	1,463
Total	9,571	9,501	9,477	9,269	8,907	8,369	7,031	1,696	7,588	7,153	6,814	6,609
Combat Coded							4,334	39%				
FIGHTERS/ATTACK/EW												
Active	3,100	3,089	3,083	2,883	2,856	2,536	2,176		2,168	1,908	1,835	1,825
Reserve	247	268	270	269	264	279	127		277	278	162	145
ANG	1,168	1,128	1,131	1,153	1,107	1,192	923		1,111	1,106	976	856
Total	4,515	4,485	4,484	4,305	4,227	4,007	3,226	805	3,556	3,292	2,973	2,826
Combat Coded					2,595	2,431	2,643	30%	2,178	1,947	1,605	1,536
A-10												
Active	456	451	428	406	393	349			138	123	131	135
Reserve	99	97	97	97	97	98			85	75	31	31
ANG	104	106	102	81	82	104			110	83	66	59
Total	659	654	627	584	572	551	554	132	333	281	228	225
Combat Coded (70% HA)							388	34%				
AC-130												
Active	10	10	10	10	10	10	10		12	12	12	21
Reserve	10	10	10	10	10	10	10		10	10	10	
ANG												
Total	20	20	20	20	20	20	20	4	22	22	22	21
Combat Coded (75% HA)							15	27%				
EC-130												
Active	14	14	14	14	22	22	22		22	22	22	22
Reserve												
ANG			8	8	8	8	8		8	8	8	8
Total	14	14	22	22	30	30	30	26	30	30	30	30
Combat Coded (75% HA)							23	116%				
EF-111												
Active	42	42	42	42	42	41	41		40	40	40	40
Reserve												
ANG												
Total	42	42	42	42	42	41	42	24	40	40	40	40
Combat Coded	24	24	24	24	24	24	24	100%	24	24	24	24
F-4												
Active	539	448	388	321	248	140			39	49	45	40
Reserve	112	117	106	48	40							
ANG	520	449	368	261	102	24			36	30	30	26
Total	1,171	1,014	862	630	390	164	59	66	75	79	75	66
Combat Coded							72	92%				36
F-15												
Active	711	732	719	758	765	740	765		686	687	646	628
Reserve												
ANG	41	66	99	111	125	163	125		155	154	140	119
F-15A/B							353					
F-15C/D							417	125				
F-15 A/B/C/D Combat Coded							250	50%				
F-15 E							125	48				
F-15E Combat Coded							75	64%				
Total	752	798	818	869	890	903	890	173	841	841	786	747
Combat Coded (60% HA)							325	53%				
F-16												
Active	866	944	1,033	979	1,027	927	1,027		868	787	777	780
Reserve	26	44	57	114	117	171	117		182	193	121	114
ANG	80	132	214	338	469	648	469		747	830	732	644
Total	972	1,120	1,304	1,431	1,613	1,746	1,613	248	1,797	1,810	1,630	1,538
Combat Coded (60% HA)							968	26%				
F-22A												
Active												
Reserve												
ANG												
Total												
Combat Coded												
F-35A												
Active												
Reserve												
ANG												
Total												
Combat Coded (75%)												
F-111												
Active	295	292	288	285	286	248	248		305	128	104	105
Reserve												
ANG												
F-111E							79	26				
Combat Coded							63	41%				
F-111F							83	64				
Combat Coded							66	96%				
Total	295	292	288	285	286	248	162	90	305	128	104	105
Combat Coded							130	69%				
F-117												
Active			49	48	48	55	48		56	58	58	54
Reserve												
ANG												
Total			49	48	48	55	55	42	56	58	58	54
Combat Coded							36	117%	36	36	36	36

	FY86	FY87	FY88	FY89	FY90	FY91	OD$ Avail	OD$	FY92	FY93	FY94	FY95
MQ-9												
Active												
Reserve												
ANG												
Total												
Combat Coded												
BOMBER$												
Active	346	393	422	411	327	250	288		248	225	178	183
Reserve	0	0	0	0	0	0	0		0	0	9	9
ANG	0	0	0	0	0	0	0		0	0	11	11
Total	346	393	422	411	327	250	288	30	248	225	198	203
Combat Coded (Conventional)					33		33	91%				
B-1												
Active	21	68	98	96	96	96	96		96	95	84	84
Reserve												
ANG											11	11
Total	21	68	98	96	96	96	96		96	95	95	95
Combat Coded (Conventional)	0	0	0	0	0	0	0		0	0	0	0
B-2												
Active					1	3	1		4	6	9	14
Reserve												
ANG												
Total					1	3	1		4	6	9	14
Combat Coded						0			0	0	3	6
B-52												
Active	263	263	262	254	230	191	191		148	124	85	85
Reserve									0	0	9	9
ANG												
Total	263	263	262	254	230	191	118	30	148	124	94	94
Combat Coded (Conventional)					33	33	33	91%	33	33		
LRS-B												
Active												
Reserve												
ANG												
Total												
Combat Coded												
TANKER$												
Active	609	611	600	599	508	504	95		507	426	360	356
Reserve	36	38	38	36	42	44	12		48	61	72	76
ANG	112	112	122	121	122	141	6		172	194	235	234
Total	757	761	760	756	672	689	654	308	727	681	667	666
Combat Coded							601	51%				
KC-10												
Active	48	56	58	58	59	59	59		59	59	59	59
Reserve												
ANG												
Total	48	56	58	58	59	59	59	46	59	59	59	59
Combat Coded					57	57	57	81%	57	57	54	54
KC-46												
Active												
Reserve												
ANG												
Total												
Combat Coded												
KC-135												
Active	524	520	509	506	413	413			413	332	267	266
Reserve	22	24	24	24	30	30			34	51	62	62
ANG	104	104	114	113	116	131			162	183	224	223
Total	650	648	647	643	559	574	635	262	609	566	553	551
Combat Coded							544	48%			489	478
TRANSPORT$												
Active	876	868	895	862	911	822	813		817	781	767	701
Reserve	153	161	152	164	168	167	168		164	168	177	184
ANG	236	236	249	262	245	247	246		246	239	241	249
Total	1,265	1,265	1,296	1,288	1,324	1,236	1,227	481	1,227	1,188	1,185	1,134
Combat Coded							821	59%				
C-5												
Active	76	76	82	83	83	82	82		82	82	82	81
Reserve	5	15	25	32	32	32	32		32	32	32	32
ANG	3	5	10	12	12	12	12		12	12	12	13
Total	84	96	117	127	127	126	126	118	126	126	126	126
Combat Coded (12PMAI/Sq)				110	109	109	109	108%	109	109	107	104
C-17												
Active						1			3	8	16	23
Reserve												
ANG												
Total						1			3	8	16	23
Combat Coded						0			0	2	9	17
C-27J												
Active												
Reserve												
ANG												
Total												
Combat Coded												
C-130												
Active	267	266	272	240	237	245	237		235	227	213	205
Reserve	144	138	119	124	128	127	128		117	104	109	111
ANG	192	194	198	220	203	204	203		198	188	196	206
C-130H												
C-130J												
Total	603	598	589	584	568	576	568	168	550	519	518	522
Combat Coded				468	460	461	461	36%	417	380	424	428

		FY86	FY87	FY88	FY89	FY90	FY91	OD$ Avail	OD$	FY92	FY93	FY94	FY95
C-141													
Active		263	255	255	254	254	249	249		237	202	194	185
Reserve		4	8	8	8	8	8	8		15	32	36	41
ANG		4	8	8	8	8	8	8		13	16	16	16
	Total	271	271	271	270	270	265	265	195	265	250	246	242
	Combat Coded				234	234	234	234	83%	234	214	214	195
CV-22													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
MC-130													
Active		21	19	36	37	29	23	23		42	32	38	16
Reserve													
ANG													
	Total	21	19	36	37	29	23	23	7	42	32	38	16
	Combat Coded (75% HA)							17	41%				
ISR													
Active		514	508	477	461	274	187	225		114	92	121	140
Reserve		7	12	8	6	4	12	4		12	12	10	10
ANG		158	161	147	128	154	141	141		98	48	29	8
	Total	679	681	632	595	432	340	370	72	224	152	160	158
	Combat Coded							236	31%				
E-3													
Active		34	34	34	34	34	34	34		34	34	34	33
Reserve													
ANG													
	Total	34	34	34	34	34	34	34	14	34	34	34	33
	Combat Coded							24	58%				34
E-8													
Active											2	0	0
Reserve													
ANG													
	Total								2		2	0	0
	Combat Coded							2	100%				2
MC-12													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
MQ-1													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
OA-10													
Active		77	79	78	78	77	26	26		26			
Reserve													
ANG													
	Total	77	75	78	78	77	26	26	12	26			
	Combat Coded							21	57%				
RC-135													
Active		19	19	19	19	19	19	19		19	19	19	19
Reserve													
ANG													
	Total	19	19	19	19	19	19	19	11	19	19	19	19
	Combat Coded							14	79%				14
RF-4													
Active		176	166	161	144	82	43	43		4	3		
Reserve													
ANG		150	153	147	128	154	141	141		98	48	29	8
	Total	326	319	308	272	236	184	184	24	102	51	29	8
	Combat Coded							147	16%				18
RQ-4													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
TR-1													
Active		20	22					22					
Reserve													
ANG													
	Total	20	22					22	4				
	Combat Coded							16	25%				
U-2													
Active								16				37	36
Reserve													
ANG													
	Total							16	5			37	36
	Combat Coded							12	42%				
E-4													
Active		4	4	4	4	4	4	4		4	4	4	4
Reserve													
ANG													
	Total	4	4	4	4	4	4	4		4	4	4	4
	Combat Coded												

	FY86	FY87	FY88	FY89	FY90	FY91	OD$ Avail	OD$	FY92	FY93	FY94	FY95
HELICOPTERS												
Active	232	201	200	202	119	116	116		112	107	103	103
Reserve	24	23	23	22	115	121	121		49	121	111	105
ANG	11	10	9	9	7	16	16		15	16	21	18
Total	267	234	232	233	241	253	253		176	244	235	226
TRAINER												
Active	1,645	1,597	1,555	1,568	1,562	1,441	1,441		1,293	1,229	1,207	1,200
Reserve	0	0	0	0	0	0	0		0	0	0	0
ANG	44	25	5	5	4	4	4		4	3	2	2
Total	1,689	1,622	1,560	1,573	1,566	1,445	1,445		1,297	1,232	1,209	1,202
SEARCH/RESCUE												
Active	0	0	0	0	0	0	0		0	0	0	0
Reserve	0	0	0	0	0	0	0		0	0	0	0
ANG	0	0	0	0	0	0	0		0	0	0	0
Total	0	0	0	0	0	0	0		0	0	0	0
LIAISON												
Active	0	0	0	0	0	0	0		0	0	0	0
Reserve	0	0	0	0	0	0	0		0	0	0	0
ANG	0	0	0	0	0	0	0		0	0	0	0
Total	0	0	0	0	0	0	0		0	0	0	0
SPECIAL RESEARCH												
Active	0	0	0	0	0	0	0		0	0	0	0
Reserve	0	0	0	0	0	0	0		0	0	0	0
ANG	0	0	0	0	0	0	0		0	0	0	0
Total	0	0	0	0	0	0	0		0	0	0	0
UTILITY/OBSERVE/OTHER												
Active	0	0	24	39	47	55	55		84	90	101	96
Reserve	0	0	0	0	0	0	0		0	0	13	13
ANG	53	60	67	69	71	54	54		49	49	73	85
Total	53	60	91	108	118	109	109		133	139	187	194
Active Force	848995	847835	806246	807780	784233	742432	767233		685315	645351	623327	587409
USAF Active Duty	608195	607035	576446	570880	535233	510432	535233		470315	444351	426327	400409
USAF Active Civilians	240800	240800	229800	236900	249000	232000	232000		215000	201000	197000	187000
Civilians % of Active Force	28.4%	28.4%	28.5%	29.3%	31.8%	31.2%	30.2%		31.4%	31.1%	31.6%	31.8%
Officers	109048	107338	105126	103697	100045	96599	96599		90376	84073	81003	78444
Line Officers	52319	50584	48342	46551	42742	75426	75426		73462	67524	64607	62275
Pilots	26444	25654	25045	24257	22290	22777	22777		19423	18480	17480	16867
Navigators/Observers	10832	10636	10546	10351	9634	9703	9703		8756	7619	6705	6215
Air Battle Managers	0	0	0	0	0	0	0		0	0	0	0
Rated Officers % of Total Officers	34.16%	33.81%	33.86%	33.37%	31.91%	33.62%	33.62%		31.18%	31.04%	29.86%	29.42%
Air Reserve Force (AFRES + ANG)					283000	294000	294000		321000	321000	303000	275000
USAF TFI (Active, AFRES + ARF)					1067233	1036432	1061233		1006315	966351	926327	862409
Active % of TFI					65.41%	63.45%	64.55%		59.43%	58.06%	58.45%	59.28%
USG Budget (CY $B)	1013.94	1033.01	1051.31	1155.89	1286.16	1386.07	1286.16		1467.39	1474.33	1525.21	1539.65
Defense Budget (CY $B)	285.14	287.42	292.01	299.56	303.25	288.87	303.25		295.07	281.08	263.32	266.39
Defense Budget % USG	28.5%	27.8%	26.8%	25.0%	23.6%	20.8%	23.6%		20.1%	19.1%	17.2%	17.3%
GDP ($B)	4403.90	4651.40	5008.50	5389.50	5734.50	5930.50	5734.50		6242.00	6587.30	6976.60	7341.10
USG Outlays (CY $B)	990.38	1004.02	1064.42	1143.74	1252.99	1324.23	1252.99		1381.53	1409.39	1461.75	1515.74
Defense Outlays (CY $B)	273.37	282.00	290.36	303.56	299.32	273.29	299.32		298.35	291.08	281.64	272.06
Defense Outlays % USG	27.6%	28.1%	27.3%	26.5%	23.9%	20.6%	23.9%		21.6%	20.7%	19.3%	17.9%
Defense Outlays % GDP	6.2%	6.1%	5.8%	5.6%	5.2%	4.6%	5.2%		4.8%	4.4%	4.0%	3.7%
Human Resource Outlays (CY$B)	481.58	502.17	533.38	568.64	619.30	689.64	619.30		772.44	827.53	865.43	923.75
Human Resource Outlays % USG	48.6%	50.0%	50.1%	49.7%	49.4%	52.1%	49.4%		55.9%	58.7%	59.5%	60.9%
Human Resource Outlays % GDP	10.9%	10.8%	10.6%	10.5%	10.8%	11.6%	10.8%		12.4%	12.6%	12.5%	12.6%
DoD Budget Authority (CY $B)	281.39	279.47	283.76	290.84	293.00	276.21	293.00		281.88	267.40	251.36	255.73
DoD Outlays (CY $B)	265.64	274.01	281.94	294.88	289.76	262.39	289.76		286.96	278.59	268.64	260.61
USAF Budget Authority ($B)	94.87	91.62	88.32	94.69	92.89	91.26	92.89		82.34	75.15	74.58	73.93
USAF Budget Authority % DoD	32.8%	31.9%	30.2%	31.6%	30.6%	31.6%	30.6%		27.9%	28.2%	28.3%	27.8%
USAF Outlays ($B)	91.19	91.14	93.06	94.68	93.55	94.51	93.55		85.02	83.80	80.25	76.80
USAF Outlays % Defense	33.4%	32.3%	32.0%	31.2%	31.3%	34.6%	31.3%		28.5%	28.8%	28.5%	28.2%

	FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
ICBMs	580	580	580	550	550	550	550	523	506	500	450	450
USAF Aircraft Inventory (TAI)												
Active	4,388	4,459	4,449	4,409	4,356	4,339	4,384	4,375	4,276	4,266	4,275	4,086
Reserve	517	451	429	429	442	445	446	433	404	385	410	396
ANG	1,428	1,383	1,353	1,350	1,355	1,360	1,352	1,314	1,337	1,339	1,332	1,300
Total	6,333	6,293	6,231	6,188	6,153	6,144	6,182	6,122	6,017	5,990	6,017	5,782
Combat Coded												
FIGHTERS/ATTACK/EW												
Active	1,714	1,686	1,635	1,616	1,617	1,575	1,589	1,584	1,595	1,591	1,591	1,533
Reserve	103	98	99	97	114	114	114	114	113	113	113	97
ANG	825	805	778	784	779	783	779	758	752	746	747	725
Total	2,646	2,589	2,512	2,497	2,510	2,472	2,482	2,456	2,460	2,450	2,451	2,355
Combat Coded	1,440	1,440	1,440	1,455	1,485	1,455						
A-10												
Active	131	130	126	123	129	128	125	123	129	129	128	125
Reserve	30	27	27	27	44	44	44	44	44	44	44	44
ANG	74	74	75	76	76	76	76	76	76	76	76	78
Total	235	231	228	226	249	248	245	243	249	249	248	247
Combat Coded (70% HA)	158	158				173						
AC-130												
Active	21	21	21	21	21	21	21	21	21	21	23	25
Reserve												
ANG												
Total	21	21	21	21	21	21	21	21	21	21	23	25
Combat Coded (75% HA)												
EC-130												
Active	26	22	22	22	22	22	20	15	17	16	16	14
Reserve												
ANG	8	8	8	8	8	8	7	7	7	8	8	7
Total	34	30	30	30	30	30	27	22	24	24	24	21
Combat Coded (75% HA)												
EF-111												
Active	37	33										
Reserve												
ANG												
Total	37	33										
Combat Coded												
F-4												
Active	12	3										
Reserve												
ANG												
Total	12	3										
Combat Coded												
F-15												
Active	620	617	615	614	614	608	609	608	604	583	567	515
Reserve												
ANG	266	116	115	116	126	126	126	126	129	139	141	145
F-15A/B												
F-15C/D												
F-15 A/B/C/D Combat Coded	295	295	295	295		288						
F-15 E												
F-15E Combat Coded	137	137	137	137		130						
Total	886	733	730	730	740	734	735	734	733	722	708	660
Combat Coded (60% HA)	432	432	432	432								
F-16												
Active	809	802	792	777	773	735	751	742	737	733	724	700
Reserve	73	71	72	70	70	70	70	70	69	69	69	53
ANG	481	607	580	584	569	573	570	549	540	523	522	495
Total	1,363	1,480	1,444	1,431	1,412	1,378	1,351	1,361	1,346	1,325	1,315	1,248
Combat Coded (60% HA)	814	814	814	814	814	821						
F-22A												
Active			2	2	3	6	8	17	27	47	73	97
Reserve												
ANG												
Total			2	2	3	6	8	17	27	47	73	97
Combat Coded			0	0	0	0	0					
F-35A												
Active												
Reserve												
ANG												
Total												
Combat Coded (75%)												
F-111												
Active												
Reserve												
ANG												
F-111E												
Combat Coded												
F-111F												
Combat Coded												
Total												
Combat Coded												
F-117												
Active	54	54	53	53	52	52	52	55	55	55	52	44
Reserve												
ANG												
Total	54	54	53	53	52	52	52	55	55	55	52	44
Combat Coded	36	36	36	36	36	36	36	36	36	36	36	

	FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
MQ-9												
Active									5	7	8	13
Reserve												
ANG												
Total									5	7	8	13
Combat Coded												
BOMBERS												
Active	185	182	179	179	181	181	183	173	172	173	172	173
Reserve	9	9	9	9	9	9	9	9	9	9	9	9
ANG	14	17	20	20	18	18	0	0	0	0	0	0
Total	208	208	208	208	208	208	192	182	181	182	181	182
Combat Coded (Conventional)												
B-1												
Active	81	77	73	73	75	75	78	67	67	67	67	67
Reserve												
ANG	14	17	20	20	18	18						
Total	95	94	93	93	93	93	78	67	67	67	67	67
Combat Coded (Conventional)	0	0	54	54	52	52						
B-2												
Active	19	20	21	21	21	21	21	21	21	21	20	21
Reserve												
ANG												
Total	19	20	21	21	21	21	21	21	21	21	20	21
Combat Coded	5	10	12	13	16	16	16	16	16	16	16	16
B-52												
Active	85	85	85	85	85	85	84	85	84	85	85	85
Reserve	9	9	9	9	9	9	9	9	9	9	9	9
ANG												
Total	94	94	94	94	94	94	93	94	93	94	94	94
Combat Coded (Conventional)	44	44	44	44	44	44						44
LRS-B												
Active												
Reserve												
ANG												
Total												
Combat Coded												
TANKERS												
Active	323	325	326	326	328	331	322	328	301	285	278	277
Reserve	81	79	77	76	77	79	78	76	81	89	89	85
ANG	236	236	237	223	223	230	240	236	243	252	260	235
Total	640	640	640	625	628	640	640	640	625	626	627	597
Combat Coded												
KC-10												
Active	59	59	59	59	59	59	59	59	59	59	59	59
Reserve												
ANG												
Total	59	59	59	59	59	59	59	59	59	59	59	59
Combat Coded	54	54	54	54	54	54	54	54	54	54	54	54
KC-46												
Active												
Reserve												
ANG												
Total												
Combat Coded												
KC-135												
Active	255	257	255	255	254	256	247	249	224	208	200	199
Reserve	72	72	70	69	69	70	68	70	76	84	84	80
ANG	223	223	224	223	223	221	231	227	234	243	251	226
Total	550	552	549	547	546	547	546	546	534	535	535	505
Combat Coded	472	472	472	472	472	472	472	472				
TRANSPORTS												
Active	698	680	663	645	616	598	586	577	562	570	578	508
Reserve	189	190	175	182	183	184	184	189	159	132	160	166
ANG	262	266	260	268	279	274	278	266	270	268	249	262
Total	1,149	1,136	1,098	1,095	1,078	1,056	1,048	1,032	991	970	987	936
Combat Coded												
C-5												
Active	81	81	81	81	81	81	81	81	73	63	52	33
Reserve	32	32	32	32	32	32	32	32	32	17	42	45
ANG	13	13	13	13	13	13	13	13	13	32	17	30
Total	126	126	126	126	126	126	126	126	118	112	111	108
Combat Coded (12PMAI/Sq)	104	104	104	104	104	104						
C-17												
Active	27	34	43	55	67	76	92	109	118	130	141	153
Reserve										2	8	8
ANG									8	8	8	8
Total	27	34	43	55	67	76	92	109	126	140	157	169
Combat Coded	22	24	30	37	46	58						
C-27J												
Active												
Reserve												
ANG												
Total												
Combat Coded												
C-130												
Active	204	197	191	191	192	191	191	190	189	196	205	173
Reserve	111	110	110	111	107	107	107	103	93	90	93	94
ANG	214	218	218	220	227	221	223	219	215	194	190	173
C-130H												
C-130J												
Total	529	525	519	522	526	519	521	512	497	480	488	440
Combat Coded	432	430	425	425	425	418						

		FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
C-141													
Active		156	139	122	101	69	39	14	10				
Reserve		46	48	33	39	44	45	45	40	20	8		
ANG		18	18	12	15	17	18	17	9				
	Total	220	205	167	155	130	102	76	59	20	8		
	Combat Coded	187	163	143	136	104	88						
CV-22													
Active											1	4	7
Reserve													
ANG													
	Total										1	4	7
	Combat Coded												
MC-130													
Active		53	53	53	55	48	48	45	44	45	43	44	46
Reserve									14	14	14	14	14
ANG					2	4	4	4	4	4	4	4	4
	Total	53	53	53	57	52	52	49	62	63	61	62	64
	Combat Coded (75% HA)												
ISR													
Active		113	117	117	113	117	121	120	125	109	110	112	238
Reserve		21	23	23	19	28	28	30	20	20	20	17	17
ANG		0	0	0	0	0	0	0	0	17	18	21	21
Total		134	140	140	132	145	149	150	145	146	148	150	276
Combat Coded													
E-3													
Active		32	32	32	32	32	32	31	32	32	32	32	32
Reserve													
ANG													
	Total	32	32	32	32	32	32	31	32	32	32	32	32
	Combat Coded						24	24	24	24	24	24	24
E-8													
Active		1	2	5	5	8	11	14	16				
Reserve													
ANG										17	18	18	18
	Total	1	2	5	5	8	11	14	16	17	18	18	18
	Combat Coded						11						
MC-12													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
MQ-1													
Active			2	4	6	6	8	8	6	6	5	5	131
Reserve													
ANG													
	Total		2	4	6	6	8	8	6	6	5	5	131
	Combat Coded												
OA-10													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
RC-135													
Active		19	19	19	21	21	21	21	21	21	22	22	22
Reserve													
ANG													
	Total	19	19	19	21	21	21	21	21	21	22	22	22
	Combat Coded						21	21	21	21	22	22	22
RF-4													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
RQ-4													
Active									2	6	9	11	12
Reserve													
ANG													
	Total								2	6	9	11	12
	Combat Coded												
TR-1													
Active													
Reserve													
ANG													
	Total												
	Combat Coded												
U-2													
Active		36	31	31	31	31	31	31	34	34	34	34	33
Reserve													
ANG													
	Total	36	31	31	31	31	31	31	34	34	34	34	33
	Combat Coded						27						
E-4													
Active		4	4	4	4	4	4	4	4	4	4	4	4
Reserve													
ANG													
	Total	4	4	4	4	4	4	4	4	4	4	4	4
	Combat Coded												

	FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
HELICOPTERS												
Active	104	165	165	165	168	164	162	165	193	202	192	182
Reserve	93	29	23	23	23	23	23	18	15	15	15	15
ANG	18	17	18	18	18	18	18	17	18	18	18	18
Total	215	215	206	206	209	205	203	200	226	235	225	215
TRAINER												
Active	1,159	1,209	1,273	1,272	1,285	1,285	1,339	1,340	1,269	1,260	1,277	1,104
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	2	0	0	0	0	0	0	0	0	0	0	0
Total	1,161	1,209	1,273	1,272	1,285	1,285	1,339	1,340	1,269	1,260	1,277	1,104
SEARCH/RESCUE												
Active	0	0	0	0	0	0	0	0	0	0	0	0
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
LIAISON												
Active	0	0	0	0	0	0	0	0	0	0	0	0
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
SPECIAL RESEARCH												
Active	0	0	0	0	0	0	0	0	0	0	0	0
Reserve	0	0	0	0	0	0	0	0	0	0	0	0
ANG	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0
UTILITY/OBSERVE/OTHER												
Active	92	91	91	93	84	84	83	83	75	75	75	71
Reserve	21	23	23	23	8	8	8	7	7	7	7	7
ANG	67	42	40	37	38	37	37	37	37	37	37	39
Total	180	156	154	153	130	129	128	127	119	119	119	117
Active Force	573001	556385	541470	529590	518654	515571	525040	534479	537004	516939	515685	496879
USAF Active Duty	389001	377385	367470	360590	355654	353571	368251	375062	376616	353696	348553	333495
USAF Active Civilians	184000	179000	174000	169000	163000	162000	156789	159417	160388	163243	166732	163384
Civilians % of Active Force	32.1%	32.2%	32.1%	31.9%	31.4%	31.4%	29.9%	29.8%	29.9%	31.6%	32.3%	32.9%
Officers	76388	73983	71892	70318	69023	68862	72032	73758	74109	73252	70539	65722
Line Officers	60349	58128	56071	55144	54322	54621	57467	59343	59841	59347	57096	52644
Pilots	16221	15405	14563	13828	13343	13005	13711	14284	14739	14667	14692	14083
Navigators/Observers	5528	5728	5580	5362	5307	5621	6464	6354	6287	6250	6264	5884
Air Battle Managers	0	0	0	0	438	526	1144	1211	1240	1328	1368	1313
Rated Officers % of Total Officers	25.00%	26.56%	28.02%	27.29%	27.65%	27.81%	29.60%	29.62%	30.04%	30.42%	31.65%	32.38%
Air Reserve Force (AFRES + ANG)	265000	261000	252000	245000	244000	251000	247000	238000	236000	236000	236000	236000
USAF TFI (Active, AFRES + ARF)	838001	817385	793470	778590	762654	766571	772040	772479	773004	752939	751685	732879
Active % of TFI	59.48%	59.12%	59.32%	59.15%	59.31%	58.48%	59.85%	61.18%	61.48%	59.58%	59.65%	58.56%
USG Budget (CY $B)	1580.91	1642.78	1692.15	1776.66	1824.87	1958.87	2090.01	2266.06	2408.18	2582.64	2780.40	2863.07
Defense Budget (CY $B)	266.18	270.36	271.04	282.24	304.00	334.71	362.01	456.01	450.55	505.77	556.28	625.84
Defense Budget % USG	16.8%	16.5%	16.0%	16.4%	16.7%	17.1%	17.3%	20.1%	20.4%	19.6%	20.0%	21.9%
GDP ($B)	7718.30	8211.70	8663.00	9208.40	9821.00	10225.30	10543.90	10979.80	11685.60	12445.70	13224.90	13891.80
USG Outlays (CY $B)	1560.48	1601.12	1652.46	1701.84	1788.95	1862.85	2010.89	2159.90	2292.84	2471.96	2655.05	2728.69
Defense Outlays (CY $B)	265.75	270.50	268.19	274.77	294.36	304.73	348.46	404.74	455.83	495.31	521.83	551.27
Defense Outlays % USG	17.0%	16.9%	16.2%	16.1%	16.5%	16.4%	17.3%	18.7%	19.9%	20.0%	19.7%	20.2%
Defense Outlays % GDP	3.4%	3.3%	3.1%	3.0%	3.0%	3.0%	3.3%	3.7%	3.9%	4.0%	3.9%	4.0%
Human Resource Outlays (CY$B)	558.27	1002.39	1033.47	1057.77	1115.52	1194.42	1317.55	1417.86	1485.81	1586.01	1671.93	1758.39
Human Resource Outlays % USG	61.4%	62.6%	62.5%	62.2%	62.4%	64.1%	65.5%	65.6%	64.8%	64.2%	63.0%	64.4%
Human Resource Outlays % GDP	12.4%	12.2%	11.9%	11.5%	11.4%	11.7%	12.5%	12.9%	12.7%	12.7%	12.6%	12.7%
DoD Budget Authority (CY $B)	254.57	258.01	258.58	278.60	290.53	309.95	345.63	437.80	471.01	483.91	536.46	602.25
DoD Outlays (CY $B)	253.26	258.30	256.14	261.38	281.23	290.98	332.12	387.34	436.52	474.15	499.28	525.09
USAF Budget Authority ($B)	72.99	73.22	76.28	81.91	83.05	89.55	100.23	125.25	125.54	127.52	141.66	148.95
USAF Budget Authority % DoD	27.4%	27.1%	28.1%	28.0%	27.3%	26.8%	27.7%	27.5%	25.6%	25.3%	25.5%	23.8%
USAF Outlays ($B)	75.38	76.62	77.91	79.16	82.09	84.83	95.56	111.56	122.16	127.94	132.71	135.26
USAF Outlays % Defense	28.4%	28.3%	29.0%	28.8%	27.9%	27.8%	27.4%	27.6%	26.8%	25.8%	25.4%	24.5%

	FY08	FY09	FY10	ODS2	FY30	Comments
ICBMs	450	450	450		450	
USAF Aircraft Inventory (TAI)						
Active	3,983	4,012	3,731		4,722	
Reserve	370	375	405		59	
ANG	1,213	1,153	1,095		151	
Total	5,566	5,540	5,231	1,397	4,932	
Combat Coded			2,811	50%		
FIGHTERS/ATTACK/EW						
Active	1,557	1,543	1,343		1,725	
Reserve	103	108	103		0	
ANG	694	671	621		7	
Total	2,354	2,322	2,067	678	1,736	
Combat Coded			1,334	51%	1,571	
A-10						
Active	188	208	184		242	FY30: 2012 AF TAF Testimony - Holmes/Posner
Reserve	51	55	44			FY10: 2011 AF Tactical A/C Testimony - Carlisle
ANG	96	92	106			
Total	335	355	334	96	242	
Combat Coded (70% HA)			174	55%	169	
AC-130						FY30: 2012 Posture Statement
Active	25	25	25		33	
Reserve						
ANG						
Total	25	25	25	6	33	
Combat Coded (75% HA)			21	29%	25	
EC-130						
Active	14	15	14		14	
Reserve						
ANG	7	7	7		7	
Total	21	22	21	12	22	
Combat Coded (75% HA)			16	76%	17	
EF-111						
Active						
Reserve						
ANG						
Total						
Combat Coded						
F-4						
Active						
Reserve						
ANG						
Total						
Combat Coded						
F-15						
Active	499	454	327		388	
Reserve						
ANG	131	134	140			
F-15A/B						
F-15C/D			254	76	249	FY30: 2012 AF TAF Testimony - Holmes/Posner
F-15A/B/C/D Combat Coded			163	47%	174	FY30: 2012 AF TAF Testimony - Holmes/Posner
F-15 E			213	72	210	2011 AF Tactical A/C Testimony - Carlisle
F-15E Combat Coded			132	55%	147	2011 AF Tactical A/C Testimony - Carlisle
Total	630	588	467	148	459	
Combat Coded (60% HA)			295	50%	321	
F-16						
Active	688	665	583			FY30: 2012 AF TAF Testimony - Holmes/Posner
Reserve	52	53	53			FY10: 2011 AF Tactical A/C Testimony - Carlisle
ANG	460	438	368			Terminate NLT FY2025
Total	1,200	1,156	1,004	416		
Combat Coded (60% HA)			669	62%		
F-22A						
Active	121	141	158		187	FY30: 2012 AF TAF Testimony - Holmes/Posner
Reserve						FY10: 2011 AF Tactical A/C Testimony - Carlisle
ANG						
Total	121	141	158	76	187	FY30: 2012 AF TAF Testimony - Holmes/Posner
Combat Coded			120	63%	135	
F-35A						
Active			4		800	1763 POR
Reserve						
ANG						
Total			4		1,200	
Combat Coded (75%)			0		900	
F-111						
Active						
Reserve						
ANG						
F-111E						
Combat Coded						
F-111F						
Combat Coded						
Total						
Combat Coded						
F-117						
Active						
Reserve						
ANG						
Total						
Combat Coded						

	FY08	FY09	FY10	ODS2	FY30	Comments
MQ-9						65 CAPs by 2014
Active	22	35	48		65	
Reserve			6			
ANG						
Total	22	35	54	20	65	
Combat Coded			40	50%		
BOMBERS						
Active	153	154	150		244	
Reserve	9	9	9		9	
ANG	0	0	0		0	
Total	162	163	159	46	253	
Combat Coded (Conventional)			96	48%		
B-1						
Active	66	66	65		59	
Reserve						
ANG						
Total	66	66	65	18	59	FY30: 2012 Posture Statement
Combat Coded (Conventional)			36	50%	33	FY30: 2012 Posture Statement
B-2						
Active	20	20	20		20	
Reserve						
ANG						
Total	20	20	20	4	20	
Combat Coded	16	16	16	25%	16	
B-52						
Active	67	68	65		65	
Reserve	9	9	9		9	
ANG						
Total	76	77	74	24	74	
Combat Coded (Conventional)	44	44	44	55%	44	
LRS-B						
Active					100	
Reserve						
ANG						
Total					100	
Combat Coded						
TANKERS						
Active	262	260	263		586	
Reserve	69	69	69		5	
ANG	215	182	179		9	
Total	546	511	511	216	600	
Combat Coded			424	51%		
KC-10						
Active	59	59	59		59	FY10: AFPAM 10-1403, Dec 03
Reserve						
ANG						
Total	59	59	59	36	59	
Combat Coded	54	54	54	67%	54	
KC-46						
Active					175	KC-46 POR
Reserve						
ANG						
Total					175	FY30: FY12 Aircraft Procurement Plan
Combat Coded						
KC-135						
Active	184	182	183		329	FY10: AFPAM 10-1403, Dec 03
Reserve	64	64	64			FY30: GAO - KC-46 Tanker Aircraft
ANG	206	173	170			
Total	454	419	417	180	329	
Combat Coded			370	45%		
TRANSPORTS						
Active	509	516	528		791	
Reserve	163	163	159		16	
ANG	248	245	244		42	
Total	920	924	931	317	849	
Combat Coded			665	47%		
C-5						
Active	33	36	36		52	FY30: 2012 Posture Statement - C-5Ms
Reserve	42	42	42			
ANG	33	33	33			
Total	108	111	111	56	52	
Combat Coded (12PMAI/Sq)			100	56%		FY10: AFPAM 10-1403, Dec 03
C-17						
Active	162	173	187		223	FY30: 2012 Posture Statement
Reserve	8	9	9			
ANG	8	8	9			
Total	178	190	205	105	223	
Combat Coded			163	64%		FY10: AFPAM 10-1403, Dec 03
C-27J						
Active					0	FY30: 2012 Posture Statement
Reserve						Terminate NLT FY2012
ANG			5			
Total			5		0	
Combat Coded						
C-130						
Active	160	150	140		318	FY30: 2012 Posture Statement
Reserve	93	92	92			
ANG	165	162	155			
C-130H					184	FY30: 2012 Posture Statement
C-130J					134	FY30: 2012 Posture Statement
Total	418	404	387	120	318	
Combat Coded			342	35%		FY10: AFPAM 10-1403, Dec 03

		FY08	FY09	FY10	ODS2	FY30	Comments
C-141							
Active							
Reserve							
ANG							
	Total						
	Combat Coded						
CV-22							
Active		10	12	16		50	FY30: 2012 Posture Statement
Reserve							
ANG							
	Total	10	12	16	12	50	
	Combat Coded			12	100%		
MC-130							
Active		49	52	55		55	FY30: 2012 Posture Statement
Reserve		14	14	10		10	
ANG		4	4	4		4	
	Total	67	70	69	24	69	
	Combat Coded (75% HA)			52	46%		
ISR							
Active		255	272	293		105	
Reserve		11	11	50		14	
ANG		27	27	23		65	
	Total	293	310	366	140	184	
	Combat Coded			285	49%		
E-3							
Active		32	32	31		32	
Reserve							
ANG							
	Total	32	32	31	12	31	
	Combat Coded	24	24	24	50%	24	
E-8							
Active							
Reserve							
ANG		18	18	17	8	17	FY30: 2012 Posture Statement
	Total	18	18	17	47%	17	
	Combat Coded						
MC-12							
Active			31	37			
Reserve							
ANG						42	FY30: 2012 Posture Statement
	Total		31	37	16	42	
	Combat Coded			32	50%		
MQ-1							
Active		144	126	138			FY30: 2012 AF TAF Testimony - Holmes/Posner
Reserve				36			Terminate NLT FY2023
ANG							
	Total	144	126	174	80		
	Combat Coded			166	48%		
OA-10							
Active							
Reserve							
ANG							
	Total						
	Combat Coded						
RC-135							
Active		25	25	22		22	FY30: 2012 AF TAF Testimony - Holmes/Posner
Reserve							
ANG							
	Total	25	25	22	12	22	
	Combat Coded	25	25	22	55%	22	
RF-4							
Active							
Reserve							
ANG							
	Total						
	Combat Coded						
RQ-4							
Active		14	17	25		11	FY30: 2012 Posture Statement
Reserve							FY30 GAO - Defense Acquisitions (55-18)
ANG							
	Total	14	17	25	12	37	
	Combat Coded			18	67%		
TR-1							
Active							
Reserve							
ANG							
	Total						
	Combat Coded						
U-2							
Active		32	33	32		32	FY30: 2012 Posture Statement
Reserve							
ANG							
	Total	32	33	32	8	32	
	Combat Coded			27	30%		
E-4							
Active		4	4	4		4	
Reserve							
ANG							
	Total	4	4	4		4	
	Combat Coded						

	FY08	FY09	FY10	OD$2	FY30	Comments
HELICOPTERS						
Active	180	159	160		155	
Reserve	15	15	15		15	
ANG	18	17	17		17	
Total	213	191	192		191	
TRAINER						
Active	1,067	1,108	994		1,108	
Reserve	0	0	0		0	
ANG	0	0	0		0	
Total	1,067	1,108	994		1,108	
SEARCH/RESCUE						
Active	0	0	0		0	
Reserve	0	0	0		0	
ANG	0	0	0		0	
Total	0	0	0		0	
LIAISON						
Active	0	0	0		0	
Reserve	0	0	0		0	
ANG	0	0	0		0	
Total	0	0	0		0	
SPECIAL RESEARCH						
Active	0	0	0		0	
Reserve	0	0	0		0	
ANG	0	0	0		0	
Total	0	0	0		0	
UTILITY/OBSERVE/OTHER						
Active	0	0	0		0	
Reserve	0	0	0		0	
ANG	11	11	11		11	
Total	11	11	11		11	
Active Force	489802	494398	507668		501000	
USAF Active Duty	327379	333408	334196		328900	AFA Almanac, FY30: 2012 Posture Statement
USAF Active Civilians	162423	160990	173472		172100	USAF Statistical Digest, FY30: 2012 Posture Statement
Civilians % of Active Force	33.2%	32.6%	34.2%		34.4%	
Officers	64805	65496	66201			USAF Statistical Digest
Line Officers	51768	52345	52722			USAF Statistical Digest
Pilots	14308	14556	15093			USAF Statistical Digest
Navigators/Observers	5888	5865	5920			USAF Statistical Digest
Air Battle Managers	1338	1396	1486			
Rated Officers % of Total Officers	33.23%	33.31%	33.99%			
Air Reserve Force (AFRES + ANG)	233000	231000	229000		229000	
USAF TFI (Active, AFRES + ARF)	722802	725398	736668		730000	FY30: 2012 Posture Statement
Active % of TFI	58.42%	59.07%	59.34%		58.55%	
USG Budget (CY $B)	3326.28	4077.48	3484.62			Annual Budget docs & President's FY12 Budget
Defense Budget (CY $B)	696.24	697.76	721.31			Annual Budget docs & President's FY12 Budget
Defense Budget % USG	20.9%	17.1%	20.7%			
GDP ($B)	14354.10	14097.50	14508.20			President's FY12 Budget
USG Outlays (CY $B)	2982.54	3517.68	3818.82			President's FY12 Budget
Defense Outlays (CY $B)	616.07	661.05	693.55			President's FY12 Budget
Defense Outlays % USG	20.7%	18.8%	18.2%			
Defense Outlays % GDP	4.3%	4.7%	4.8%			
Human Resource Outlays (CY$B)	1855.64	2155.79	2365.73			President's FY12 Budget
Human Resource Outlays % USG	63.6%	61.3%	62.5%			
Human Resource Outlays % GDP	13.2%	15.3%	16.4%			
DoD Budget Authority (CY $B)	673.49	664.52	695.67			FY12 Green Book
DoD Outlays (CY $B)	554.60	636.34	666.74			FY12 Green Book
USAF Budget Authority ($B)	157.91	163.53	164.94			FY12 Green Book: FY30 is FY13 request
USAF Budget Authority % DoD	22.7%	23.4%	22.87%			
USAF Outlays ($B)	144.98	152.31	159.51			FY12 Green Book
USAF Outlays % Defense	23.5%	23.0%	23.0%			FY12 Green Book

Glossary

Air Interdiction (AI): Air operations conducted to divert, disrupt, delay, or destroy the enemy's military surface capabilities before it can be brought to bear effectively against friendly forces, or to otherwise achieve objectives that are conducted at such distances from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces is not required. (JP 1-02)

Close Air Support (CAS): Air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces. (JP 1-02)

Defensive Counter Air (DCA): All defensive measures designed to detect, identify, intercept, and destroy or negate enemy forces attempting to penetrate or attack through friendly airspace. (JP 1-02)

Fighter Escort: An offensive counterair operation providing protection sorties by air-to-air capable fighters in support of other offensive air and air support missions over enemy territory, or in a defensive counterair role to protect high value airborne assets. (JP 1-02)

Intelligence, Surveillance, and Reconnaissance (ISR): An activity that synchronizes and integrates the planning and operation of sensors, assets, and processing, exploitation, and dissemination systems in direct support of current and future operations. This is an integrated intelligence and operations function. (JP 1-02)

Offensive Counter Air (OCA): Offensive operations to destroy, disrupt, or neutralize enemy aircraft, missiles, launch platforms, and their supporting structures and systems both before and after launch, but as close to their source as possible. Offensive counterair operations range throughout enemy territory and are generally conducted at the initiative of friendly forces. These operations include attack operations, suppression of enemy air defenses, fighter escort, and fighter sweep. (JP 1-02)

Suppression of Enemy Air Defenses (SEAD): Activity that neutralizes, destroys, or temporarily degrades surface-based enemy air defenses by destructive and/or disruptive means. (JP 1-02)

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